Association des Éleveurs d'oies et de canards du Québec (AECOQ)

(Association of Quebec Ducks and Geese Producers)

Duck Production Guide

Hatchery

Breeders

Rearing

Foie Gras Production

Transport

The AECOQ brings together, consults and represents ducks and geese producers in Quebec to promote the industry and defend the interests of its members.

L'Association des Éleveurs d'oies et de canards du Québec (AECOQ)
216, Denison street East, Granby (Québec) J2H 2R6

Version 1.0, February 14, 2018

Association des Éleveurs d'oies et de canards du Québec

The «Association des éleveurs de canards et d'oies du Québec (AECOQ)» presents its first edition of the ***Duck Production Guide***.

This initiative is part of an industry effort that aims to improve the welfare of waterfowl reared in Quebec.

This project is founded in part under the support program for the implementation of food safety systems, biosecurity, traceability and health and well-being of the animals. In accordance with Canada-Quebec Growing Forward 2.

It should be noted that the Canada and Quebec Governments have reached bilateral agreement Growing Forward 2, for which they were granted funding of $293 million over the five-year period from 2013 to 2018. This important agreement is designed to support strategic initiatives in innovation, competitiveness and development of markets, both for the benefit of the agricultural sector as that of food processing sector.

Cultivons l'avenir 2
Une initiative fédérale-provinciale-territoriale

Canada Québec

Also available in French

Disclaimer

Information contained in this publication is subject to periodic review in light of changing practices, government requirements and regulations. No subscriber or reader should act on the basis of any such information without referring to applicable laws and regulations and/or without seeking appropriate professional advice. Although every effort has been made to ensure accuracy, the authors shall not be held responsible for loss or damage caused by errors, omissions, misprints or misinterpretation of the contents hereof. Furthermore, the authors expressly disclaim all and any liability to any person, whether the purchaser of the publication or not, in respect of anything done or omitted, by any such person in reliance on the contents of this publication.

Table of Contents

Preface

The «Association des éleveurs de canards et d'oies du Québec» (AECOQ) (Quebec Ducks and Geese Producers Association) brings together, consults and represents ducks and geese producers in Quebec to promote the industry and defend the interests of its members. Its vision is to increase the volume of ducks and geese's production using practices, standards and policies that maintain products' quality and promote competitive positioning as well as the profitability of the industry.

Quebec generates more than 40% of the Canadian production of Pekin ducks and 100% of the production of force-fed ducks in Canada. Quebec is undoubtedly the leader in these productions.

The AECOQ identified as a priority the development and sharing of improved production practices. Regarding husbandry practices, duck meat and foie gras productions are unique. Since no national code of practice exists, the AECOQ recognizes a need to develop its own production guide based on the scientific literature available. The addressed practices represent a workable balance between the respect of animal welfare and the ability of producers to make changes without jeopardizing their profitability. Moreover, the expertise of force-fed ducks in Canada is predominantly found in Quebec.

The growing requirements in animal welfare, the threat of animal welfare activism and the pressures of social acceptability require awareness, standardization and enforcement of good practices in the waterfowl industry.

The waterfowl industry, contrary to the other sectors of poultry production, does not benefit from the same support as supply management, from specific policies, nor do they have standards in accordance to the reality of waterfowl (which are often associated to chickens despite major physiological differences). This project aims to overcome this shortcoming concerning good practices in duck production.

This guide applies to all phases of production including the transport of animals. Each section of this guide includes recommended practices and requirements. The requirements are husbandry practices or actions that must be followed in all aspects of production and transport related to ducks. The AECOQ encourages the stakeholders to establish all recommended practices but understands that some of those steps may not be implemented immediately. Stakeholders commitment is key to pave the way and to ensure that standards are established and put in place as soon as possible.

This document is not meant to be a regulation nor is it indisputable truth. Its goal is to help integrate quality animal husbandry practices and to improve animal welfare in duck production. This guide does not substitute for any existing regulation nor any scientific evidence beyond what is presented.

For this guide to be reliable and socially acceptable, it has been revised by a range of people who show interest in duck production other than stakeholders of the production. To achieve this, a committee was

established which includes, among others, representatives of the following groups according to their availability:

- Association des éleveurs de Canards et d'Oies du Québec (AECOQ)
- Conseil de la transformation alimentaire du Québec (CTAQ) (Food Processing Council of Quebec)
- Poultry veterinarians
- Animal Welfare Specialist
- Retail Council of Canada (RCC)
- Canadian Food Inspection Agency (CFIA)
- Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ) (Quebec Ministry of Agriculture, Fisheries and Food)

Acknowledgments

National Farm Animal Care Council (NFACC):

The preparation of this guide was largely inspired by the methodology and content of the Codes of Practice from the National Farm Animal Care Council (NFACC), mainly the structure and some key elements from the Code of Practice for the Care and Handling of Hatching Eggs, Breeders, Chicken and Turkeys, published in 2016:
http://www.nfacc.ca/codes-of-practice/chickens-turkeys-and-breeders

In August 2018, the AECOQ got the permission to use this code as a guideline using its form and content, from the General Manager of NFACC, Mme Jackie Wepruk.
The use of NFACC materiel allowed to accelerate the conception process of our guide and be consistent with national codes at the same time. Because we must walk before we run, this provincial guide could be the basis for a more formal code at the national level.

Members of the Association des Éleveurs de Canards et d'Oies du Québec :

The production of this guide required a lot of time from the AECOQ members. We wish to thank all AECOQ members and employees who contributed directly or indirectly to the various advisory and validation meetings.

Review committee members:

Thanks to the review committee members of this guide for their generosity and sound advice. Your contribution helps broaden horizons of the AECOQ and the editorial committee to generate an even more relevant document.

Glossary

The following terms and definitions refer only to how the terms are used in this document.

Ad Libitum: Providing birds with unrestricted access to feed and/or water at all times**.**

All-In/All-Out: A production strategy whereby all birds are moved into and out of facilities and/or between production phases.

Ammonia: A noxious gas common in animal production that forms during breakdown of nitrogenous wastes in animal excrement.

Beak Treatment/Beak Trimming: Treatment or removal of a portion of the beak. Can be performed using infrared (IR) energy light or using the hot-blade method, either manually or with automated equipment.

Bedding: Loose material such as wood shavings or chopped straw that is added to housing environments.

Biosecurity: Measures designed to reduce the risk of introduction, establishment, and spread of animal diseases, infections, or infestations to, from, and within an animal population.

Bird: A duck of any age, size, weight, or sex.

Boutentrain ("teaser"): In artificial insemination, a female duck used to stimulate ejaculation in breeder drakes.

Break-Out: The process of opening unhatched eggs to look for embryo abnormalities as a technique to identify causes of hatchability problems.

Brooding: The period after hatch when special care and attention must be given to ducklings (i.e. up to 7 days) to ensure their health and survival due to their immature thermal regulation systems.

Cannibalism: The act of one bird consuming the flesh of another bird.

Competent: Demonstrated skill and/or knowledge in a particular topic, practice, or procedure that has been developed through training, experience, or mentorship, or a combination thereof.

Cull/Culling: The process of removing birds or hatching eggs from production based on specific criteria.

Dark Period: Length of time where light intensity is no more than 20% of the light intensity of the light period.

Diurnal Lighting: A daily lighting pattern that distinguishes between light and dark.

Distressed ducks: ducks that are stressed beyond what would be deemed normal for a given situation, as evidenced by any one or a combination of the following signs: pain/suffering; difficulty breathing/open-mouth breathing or gasping; stiffness; reluctance to move (no other visible abnormalities); inability to rise; trembling. (inspired from the definition of distressed pig (1)).

Down: the first feathers of young birds.

Downtime: The period of time between flocks that allows for the reduction in numbers of disease-causing micro-organisms within the barn or range area. This period can be shortened if a prior cleaning is done.

Duck Breeder: A mature male or female duck used for breeding to produce duck hatching eggs.

Duckling: a hatched young duck; usually on the first days of life, when it is still covered with down.

Embryo: A bird in its earliest stages of development following cleavage of the zygote and ending at hatching.

Enrichment: Enhancement of an animal's physical or social environment.

Euthanasia: The process of ending the life of a bird in a way that minimizes or eliminates pain and distress. It is characterized by rapid, irreversible unconsciousness (insensibility), followed by prompt death

Feather Pecking: A behaviour problem in domestic birds that involves a bird pecking (or plucking) the feathers of flock mates**.**

Flock Inspection(s): The process of routinely checking flocks (e.g. for bird health and well-being, availability and access to feed and water, mortality) and/or barns (e.g. for environmental conditions, operating condition of equipment), which can be done primarily in person or alternatively through remote access where appropriate and feasible.

Force-fed duck: a duck raised for meat and foie gras production.

Force-feeding: the act of inserting a funnel in the oesophagus of a waterfowl to put increasing quantities of feed in it.

Free-Run: A system where birds roam freely inside a barn but do not have outdoor access**.**

Hatchery: A facility that receives hatching eggs from poultry breeder operations and cares for them through storage, incubation, hatching, processing, and holding.

Hatching Egg: A fertilized bird egg that is suitable for incubation and hatching.

Incubation: The act of keeping hatching eggs in conditions that are favourable for growth and development in order to hatch them.

Insensible/Insensibility: The point at which an animal no longer has the ability to feel pain or perceive and respond to its environment (e.g. light).

Litter: The combination of bedding and/or bird excreta, feathers, feed, dust, and other materials on floors of bird housing systems.

Mass Depopulation: The on-farm killing of an entire flock or of a large number of birds.

Meat duck: a duck raised for meat production.

Microwave Treatment: Treatment of toes and/or claws by microwave energy**.**

Monitor: The act, by company personnel, of conducting a planned sequence of observations, tests, or measurements to assess whether a critical control point, a process control, and/or a prerequisite program is under control. This includes recording the results of those observations (3**).**

Moulting: A natural seasonal event in which birds substantially reduce their feed intake, cease egg production, and replace their plumage. Induced or controlled moulting is a process that simulates natural moulting and extends the productive life of breeders (2).

Non-Penetrating Captive Bolt: A specially designed device that propels a blunt bolt with great force that, when applied in the correct position, causes immediate loss of sensibility and results in death.

Palm Treatment: the process of minimally altering the palm of the birds for identification purposes.

Penetrating Captive Bolt: A specially designed device used for stunning and euthanasia that, when applied in the correct position, causes immediate loss of sensibility and results in irreversible brain injury and death.

Personnel: All individuals, including family members, who have responsibilities for working with or caring for hatching eggs or birds. This excludes external service providers.

Plan: A set of actions, which may be recorded in writing, that have been thought of as a way to accomplish or achieve a desired outcome**.**

Poultry: domestic bird, typically from the gallinacean or waterfowl groups, raised for meat or egg production in traditional farmyard or commercially.

ppm: Parts per million.

Range: The outdoor area to which birds may have access from indoor production systems**.**

Recommended practices: the recommended practices of this guide may complement the guide's requirements, promote producer education, and can encourage adoption of practices for continual improvement in animal welfare outcomes. Recommended Practices are those that are generally expected to enhance animal welfare outcomes, but failure to implement them does not imply that acceptable standards of animal care are not met.

Requirements: these refer to either a regulatory requirement or an industry-imposed expectation outlining acceptable and unacceptable practices and are fundamental obligations relating to the care of animals.

Social Hierarchy: The order whereby individual birds establish their dominance position within a group of birds.

Stockmanship: The practice of undertaking the immediate day-to-day husbandry tasks associated with looking after birds.

Toe Treatment(s): A process that physically alters toes on birds and that includes toenail clipping and toe trimming.

Training: The act that aims to impart skills and/or knowledge on a formal or informal basis (e.g. through mentoring) that results in the recipient's understanding and/or ability to perform assigned duties.

Unfit for Transport: A bird with a reduced capacity to withstand transportation and where there is a high risk that transportation will lead to suffering.

Wet Bird: A bird with wet or moist feathers in contact with the skin and/or wet or moist skin resulting in decreased capacity to thermoregulate**.**

Section 1 - Personnel Knowledge and Skills

Management (owner, operator or designated person) is responsible for setting and maintaining the priority for waterfowl welfare. Stockmanship is one of the most important determinants of waterfowl welfare. This responsibility rests with all personnel, those entrusted with the day-to-day care of birds as well as those contracted to perform specific duties (e.g. vaccinating, catching).

Frequent, positive interactions with humans, have been linked to reduced fear and stress in birds (4).

Before they are assigned their duties, personnel need to be knowledgeable of the basic needs of the birds entrusted to their care. This can be accomplished through training, which may be formal or informal (e.g. through mentoring), or a combination of both (Refer to *Glossary*).

REQUIREMENTS

Management must develop and communicate a Policy or a Code of Conduct that ensures bird welfare to all personnel involved in husbandry practices.

All individuals who work with or care for hatching eggs or birds must be competent in the tasks they are assigned.

Personnel must be monitored and receive additional training as necessary.

RECOMMENDED PRACTICES

a. develop a written Code of Conduct covering bird welfare and ensure that all personnel are aware of it (e.g. ask personnel to sign it, review annually with personnel). Refer to ***Appendix A*** - Sample Waterfowl Welfare Policy

b. the hereby production guide should be available for all employees

c. identify supervisors or managers that personnel can approach with waterfowl welfare questions or concerns. Implement a confidential means of reporting concerns

d. supervise external service providers to ensure that bird welfare is not compromised.

Section 2 - Hatcheries

Hatcheries are specialized facilities that receive fertilized eggs from waterfowl breeder operations and care for them through storage, incubation, hatching, processing, holding and transport. Hatcheries also perform various management procedures on eggs and newly-hatched ducklings to protect their health and prepare them for the growing phase. This Guide covers those hatcheries that incubate hatching eggs used in waterfowl production.

Research indicates that the stage of incubation at which embryos become sensible to pain can be as early as 50% of incubation (5). Environmental or management problems during storage or incubation of eggs may cause premature embryo development, abnormalities, or even death (6), all of which have obvious implications for bird welfare. It is for this reason that this Guide includes recommendations for the handling and management of hatching eggs.

2.1 Emergency Management and Preparedness

Refer to *section 5.4* - *Emergency Management and Preparedness*

2.2 Hatching Egg Management and Incubation

Proper handling, storage, and incubation of hatching eggs is important to promote healthy embryo development and to minimize embryo mortality. Better results in hatchability are obtained when eggs begin incubation within 7 days of being laid (7) (8).

REQUIREMENTS

Hatching eggs must be transported, handled, stored, and incubated in ways that promote healthy embryos.

RECOMMENDED PRACTICES

a. keep vehicles used to transport hatching eggs clean, and sanitized or disinfected, and in good working order to ensure that eggs arrive at their destination in good condition
b. ensure vehicles have sufficient capabilities for heating or cooling and ventilation to maintain similar conditions provided in the hatchery egg storage area, even if the vehicle is stationary for a certain period of time
c. protect eggs from unintended fluctuations in temperature
d. maintain relative humidity levels during egg storage that prevent excessive moisture loss
e. maintain environmental conditions in accordance with the projected egg storage time
f. check for incidence of cracked and dirty eggs during traying, and remove eggs that are unacceptable
g. tray eggs by placing the blunt end up
h. prevent cooler, heater, and/or humidifier fans from blowing directly on the eggs during storage.
i. use standard procedures to minimize contamination of the hatchery during the cleaning of the eggs

2.3 Hatching Egg Transfer

Transfer is the process of moving eggs from the incubator to the hatcher, which occurs after embryos are sensible to pain. Damaged or contaminated eggs are removed and euthanized; infertile eggs may also be removed (9).

REQUIREMENTS

Hatching eggs must be handled and transferred in ways that promote healthy ducklings

Eggs with the possibility of live embryos that are removed at transfer must be euthanized (Refer to Appendix B - Methods of Euthanasia).

2.4 Ducklings Processing

After hatching, ducklings are removed from the hatchers and separated from the egg shells. Processing may include sexing, grading, vaccination and medication, and physical alterations (Refer to *Section 2.5 - Physical Alterations and Bird Identification*). Assessing the viability of ducklings, including fitness for transport, is an important part of processing.

Some aspects of processing may be automated, so regular inspection and maintenance of processing equipment is important to ensure safe handling of the ducklings.

REQUIREMENTS

Ducklings, as well as boxes with ducklings, must be kept, treated, and handled in ways that prevent injury and minimize stress.

Ducklings, as well as boxes with ducklings, must not be dropped from heights that may cause injury.

Live ducklings must be removed from hatch residue as soon as possible.

Ducklings must be inspected regularly to ensure that they appear, behave, and sound normal.

Prompt action must be taken to identify and remedy the causes of duckling injuries.

Injured or malformed ducklings that are suffering and unhatched live embryos not destined for further examination (break-out) must be euthanized as soon as possible.

Break-out of unhatched eggs must take place within the day of hatch.

Vaccines and treatments must be stored, mixed, and administered according to the manufacturers' recommendations and/or the recommendation of a veterinarian.

Ducklings must never be squeezed, except for the purpose of sexing by vent examination.

All loose ducklings must be retrieved as soon as possible.

RECOMMENDED PRACTICES

a. monitor hatchability and cull rates. Take steps to identify and remedy significant deviations from expected rates

b. do not drop ducklings from heights exceeding 15 cm (5.9 in) onto a hard surface or 30 cm, (11.8 in) onto a soft surface

c. move hatching trays with live ducklings smoothly. Tip trays to remove ducklings and hatch residue in such a way that the ducklings do not pile or become trapped.

2.5 Physical Alterations and Bird Identification

Part of the processing of ducklings at hatcheries can involve physical alterations that are intended to protect their welfare in the long-term, even though the procedures themselves may cause pain in the short-term (10) (11). Such physical alterations are meant to protect the birds from injuring each other (claws, beaks). However, these alterations should not be performed unless necessary, and only when other methods are deemed insufficient. For more information refer to *section 6.7 Managing Harmful Behaviour*.

Beak treatments remove the tip of the beak to help reduce feather pecking and cannibalism. Unlike hot blade trimming, infrared treatment uses an infrared energy light that is less painful (11) (12). When beak treatment is not possible, other methods may reduce pecking but may not eliminate the problem entirely (12). Toenail clipping prevents birds from injuring other birds during mating and periods of high activity. When performing toe treatments, the objective is to remove the nail with minimal tissue damage.

REQUIREMENTS

Physical alterations to beaks and toes must be reviewed and evaluated regularly for welfare improvements.

All equipment used to perform physical alterations must be regularly inspected, maintained, calibrated, cleaned, and used according to manufacturers' instructions.

RECOMMENDED PRACTICES

a. hatcheries should stay aware of most recent methods and equipment for performing these procedures

b. when necessary, use preferred methods as listed in Table 2.1 – *Possible physical alterations performed on day-old ducklings in hatcheries*

c. adopt new, more humane technologies and methods for performing physical alterations as they become available

d. when available and suitable, use strains that do not require physical alterations and other methods that reduces pecking. (12)

e. ensure that identification devices permanently or temporarily attached to birds are lightweight, safe and do not cause injury to both the identified bird and other birds in the flock.

Table 2.1 – Possible physical alterations performed on day-old ducklings in hatcheries.

Alteration	Methods (in order of preference)
Beak treatment	Infrared treatment Hot blade trimming
Palm treatment	Scissors (punch)
Toe treatment	Microwave treatment Scissors

2.6 Holding, Loading and Transporting ducklings

It is important that stress is minimized throughout the transport process and that ducklings arrive at their final destination in good condition.

The federal requirements for animal transport are covered under the Health of Animals Regulations, Part XII (Transportation of Animals) (13).

A separate Code of Practice for transportation, which applies to vehicles transporting animals on public roads and highways, is available on the National Farm Animal Care Council's website. Refer to ***Appendix I***- *Resources for Further Information*. However, hatcheries typically manage the entire transportation process due to the fact that they own and operate specialized equipment and employ the drivers; therefore, the condition of ducklings during transport falls within the scope of this Guide, as well. This Guide also applies to situations where non-specialized equipment is used for the transport of ducklings.

Ducklings possess energy and water reserves in the form of the yolk sac, which serves to sustain ducklings for a period of time after hatch (14) (15).

These reserves can sustain ducklings for up to 72 hours after hatching and, along with appropriate thermal conditions during transport, help to protect ducklings' health. (16).

It is the responsibility of the hatchery to ensure that ducklings are fit for the intended journey.

Fit ducklings are those in good physical condition and health that are expected to reach their destination in good condition.

REQUIREMENTS

Boxes used for transport must be new or clean and disinfected.

Boxes with ducklings must be moved smoothly and in such a way that the ducklings do not pile or become trapped.

Boxes containing ducklings must not be thrown or dropped.

Ducklings that are deemed unfit for transport must be cared for or euthanized.

Appropriate environmental conditions must be maintained throughout the transport process to ensure that ducklings arrive at their final destination in good condition.

Ducklings must be able to stand erect during transport.

RECOMMENDED PRACTICES

a. maintain holding areas for boxes of ducklings at a temperature range of 21-27°C (70-80°F) and a relative humidity range of 40-60%

b. monitor the vent temperature of a sample of ducklings during holding to ensure that they maintain a normal core body temperature range (39,0-40,5 °C/102-105 °F) (17). A human ear thermometer is a good tool for this application

c. if travelling in a non-climate-controlled vehicle, consider both the outside temperature and the duration of transport when determining the optimum density of ducklings in boxes. In hot weather or when transporting ducklings over long distances, reduce the packing density

d. provide no less than 25 cm^2 (3,9 po^2) box floor space per duckling (18). The maximum group size for a single compartment should be adjusted according to the equipment specifications

e. adjust vehicle temperature prior to loading ducklings to prevent them from becoming overheated or chilled

f. monitor and adjust ventilation, temperature, and spacing of boxes so that ducklings can maintain their normal core body temperature

g. minimize the change in environment if, during transportation, boxes are to be transferred between vehicles

h. keep vehicles used to transport ducklings clean, and disinfected or sanitized, and in good working order to ensure that ducklings arrive at their destination in good condition

i. check ducklings at random to ensure that they appear, behave, and sound normal prior to departure

j. deliver ducklings as soon as possible after hatching

k. deliver all ducklings destined for any given barn floor at the same time to avoid challenges associated with meeting different age-related needs

l. provide gel pucks or alternative sources of hydration to ducklings when the duration between hatch and placement is expected to exceed 24 hours.

2.7 Pest Control

Refer to section 5.2.2: *Pest Control*.

2.8 Euthanasia at Hatcheries

Refer to section 8.1: *Euthanasia at Hatcheries*

Section 3 - Housing and Environment

3.1 Housing

Birds are typically housed indoors in free-run systems. Housing needs to provide appropriate space, ventilation and temperature, and protection from predators. Premises and equipment must to be designed, maintained and cleaned to control pest introduction. (refer to section 5 : *Flock Health Management*).

REQUIREMENTS

Waterfowl housing and its components must be designed, constructed, and regularly inspected and maintained in a manner that minimizes the potential for injury and allows for inspection of all birds.

RECOMMENDED PRACTICES

a. Based on the needs, situations and evolution of behavioural science in ducks, stakeholders must stay up to date on enrichment methods that could improve the welfare of the animals by enhancing their physical and social environment. The goals of enrichment measures are (1):

- Increase the number and diversity of normal behaviours
- Prevent abnormal behaviours or reduce their frequency and severity
- Increase positive use of environment (e.g. use of space)
- Improve the animal's capacity to overcome undesirable behaviour or difficult physiological conditions

3.2 Feed and Water Equipment

Providing all birds access to feed and water is essential to birds' health, welfare and productivity, and important in minimizing competition for resources. Refer to section 4: *Feed and Water* for additional guidelines on bird nutrition and hydration.

REQUIREMENTS

Feed and water equipment must be maintained in good working order, and any defective systems must be attended to without delay.

RECOMMENDED PRACTICES

a. design, construct, and locate feed and water equipment to minimize the risk of contamination (e.g. from the litter) and competition
b. follow manufacturer recommendations, if available, for guidance on feeder and drinker spaces. It is also a common practice to feed breeders directly on the floor. If the recommendations are not available, refer to Appendix C : *Recommended Feeder and Drinker Spaces for Ducks*

3.3 Environmental Management

3.3.1 Temperature, Ventilation and Air Quality

Temperature

Optimal temperature ranges are not the same for all birds or stages of production. Generally, birds can maintain their body temperature after the first few days of age through a variety of behavioural mechanisms, assuming that the ambient temperature is within certain limits. (refer to table 3.1)

Bird behaviour can be used as a reliable indicator of thermal comfort. Signs that indicate that temperature is too high include:

- crowding of birds away from the heat source
- frequent spreading and flapping of wings
- panting

Conversely, signs that indicate a temperature is too low include:

- crowding
- feather ruffling
- rigid posture
- trembling
- huddling or piling on top of each other
- excessive vocalization (mainly for ducklings)

Table 3.1 – General guidelines of temperature ranges for all types of ducks (19)

Bird Age	Temperature Range*
1-7 days	30-34 °C (86-93 °F)
1-5 weeks	Lower by 3 - 5 °C (6 - 10 °F) each week
6 weeks on	13- 17 °C (55,4 - 62,6 °F)

*Ambient temperature felt at bird level

Ventilation and Air Quality

Ventilation plays a key role in maintaining a comfortable and healthy environment for birds.

Air quality is a complex issue, interacting with a number of important factors, such as bird size and age, stocking density, ambient temperature and relative humidity, dust, and ammonia levels.

Ammonia is an irritant. Domestic fowl are able to detect it at 5 ppm and concentrations greater than 25 ppm can cause short-term damage to respiratory systems and feet and can lead to corneal ulcerations (10). Bird health and welfare may be compromised at ammonia levels as low as 10 ppm (10).

High concentrations of carbon monoxide (CO) and carbon dioxide (CO_2) can affect bird welfare and can even be lethal. CO_2 is produced by the birds' respiration as well as by the burning of hydrocarbon fuels

(oil/gas) used in heating equipment. In an insufficiently ventilated barn, toxic CO may be produced. Both CO and CO_2 are odourless and colourless.

REQUIREMENTS

Waterfowl housing must be designed and constructed in a manner that allows for good ventilation and air quality.

Heating and ventilation systems must be inspected regularly and maintained in working order.

Bird behaviour must be observed, and necessary corrective action taken as soon as possible if birds are displaying signs of thermal discomfort.

Action must be taken to manage ammonia levels if they reach a harmful range (e.g. 20 to 25 ppm)

RECOMMENDED PRACTICES

Temperature and humidity:

a. maintain barn temperatures in a range appropriate for the age of birds. Refer to Tables 3.1 and/or consult the primary breeder, hatchery, or ducklings' supplier for guidelines
b. check birds frequently during hot and humid conditions
c. balance the interactions between temperature and relative humidity by adjusting heating and ventilation systems. Refer to Table 3.2 for guidance on determining Humidex values
d. aim for a relative humidity level between 45% and 70%. (21) (22) Higher relative humidity will negatively affect litter quality and may increase the chance of heat stress in birds at high temperatures. Take corrective action if humidity levels exceed 70%
e. monitor daily minimum and maximum temperatures and relative humidity in barns to assist in managing air quality. Investigate abnormal fluctuations and take corrective action
f. install and maintain an automated alarm system to alert personnel if barn temperature falls outside of the target range
g. take measures to lower the risk of heat stress during hot weather (e.g. increase ventilation, utilize misters, utilize evaporative cooling systems)
h. adjust duckling orders so that stocking densities are appropriate for the expected seasonal conditions the birds will experience during production

Table 3.2 - Determining Humidex values (« feels like » temperature) based on temperature and relative humidity.

Relative Humidity	Temperature				
	15 °C	**20 °C**	**25 °C**	**30 °C**	**35 °C**
50 %	15°C	22 °C	28 °C	36 °C	45 °C
60 %	15°C	24 °C	30 °C	38 °C	46 °C
70 %	16°C	25 °C	32 °C	41 °C	49 °C
75 %	16°C	26 °C	33 °C	42 °C	50 °C
80 %	17°C	26 °C	33 °C	43 °C	52 °C
85 %	17°C	27 °C	34 °C	44 °C	53 °C

For more information about managing the environmental temperature for ducklings, refer to section 6.2: *Receiving and Brooding ducklings*.

Ventilation:

i. maintain uniform air movement throughout the barn
j. protect birds from the draft during cold weather

Gas:

k. monitor CO_2 and CO levels by utilizing appropriate measuring devices
l. monitor ammonia levels daily using appropriate measuring devices when necessary
m. increase monitoring frequency during cold and/or humid weather. Take steps to avoid ammonia concentrations exceeding 10 ppm. It is important to use reliable tools to measure ammonia levels. Relying solely on smell is not sufficient since individuals' sense of smell can become accustomed to the odour (20) (21) (22).
n. action to control ammonia levels includes the following: increase ventilation and/or heat, evaluate stocking densities for subsequent flocks, minimize water leaks/spillages

3.3.2 Litter and Slatted Floor Management

Good litter quality will help maintain air quality as well as reduce the incidence of litter-related problems, which can occur if litter is too wet or too dry. Litter that is too wet may lead to health problems (e.g. hock burns, foot pad lesions, breast blisters). Litter that is too dry results in higher dust levels, which can lead to respiratory problems. Litter that is at the correct moisture level will compact loosely in the hand after squeezing. Litter that is too wet will compact tightly, whereas litter that is too dry will not compact at all.

The choice of slatted floor is essential to avoid health problems in ducks. It is important to choose a slatted floor adapted to the age of the ducks.

Environmental factors such as ventilation, diet, and bedding material can all affect litter quality (10).

REQUIREMENTS

Bedding that is provided must not be harmful or toxic to birds.

Clean bedding or slatted floor must be provided for the ducklings at placement.

Enough bedding must be provided for the comfort of the birds.

The slatted floor must be adapted to ducks and must not cause any discomfort, pain nor injuries to the ducks

Litter or slatted floor condition must be monitored daily, and action taken immediately to keep it in an acceptable state.

RECOMMENDED PRACTICES

a. inspect bedding used in barns for visible mould or other contaminants
b. monitor litter condition throughout the barn. Pay special attention to litter around feeders and waterers, which is often wetter than elsewhere in the barn and may need corrective action
c. balance moisture levels in litter to avoid excessive dust (too dry) or caking (too wet)
d. monitor and manage the incidence and severity of hock burns, breast blisters, and foot pad lesions. These are signs of poor litter quality
e. inspect the floor and the slatted floor daily; repair or replace all the areas as needed
f. placing waterers and feeders on slatted floors helps reduce wet litter problems

3.4 Lighting

The main factor influencing sexual maturity and onset of lay is light stimulation along with controlled feeding and body weight. To ensure a good start, the birds should get 23 hours of light on their first 48 hours of life. After a few days, once the ducklings can locate the feed and water, lighting can be reduced or removed completely. However, it is recommended to keep a pilot light to reduce waves of panic or hysteria (25).

REQUIREMENTS

A day/night rhythm should be established according to the recommendations of the breeders' company. (26)

Light control systems must be inspected regularly and maintained in working order.

RECOMMENDED PRACTICES

a. evaluate the lighting program as a potential contributing factor to behavioural problems such as aggression
b. inspect, clean or change light bulbs frequently
c. measure light intensities at bird level
d. minimize large variations in light intensities throughout the barn
e. refer to Appendix D : Example of Lighting Program

3.5 Stocking Densities

There are different types of recommendations to obtain optimal flock size. In fact, the size of the flock is not that important if waterers and feeders are in sufficient numbers and easily accessible. (27)

Duck stocking densities depend on the type of flooring. One must also consider that the heat generated by the animals increases with the size of the birds. Stocking density can be measured as the number of ducks per m^2 or for meat ducks, in kg per m^2 (23).

REQUIREMENTS

Space allowance must be sufficient to allow all birds to be able to sit at the same time.

Health and/or injury data, if available from processors, must be used to help determine if on-farm stocking densities are contributing to recurring health and/or welfare problems (e.g. foot pad and breast lesions, scratches and bruises).

The number of birds must not exceed that which can be accommodated by the available barn space and equipment (e.g. feeders, waterers, nest boxes).

RECOMMENDED PRACTICES

Rearing phase*:*

a. birds must have enough space to move freely and be able to stand normally, turn around and stretch their wings without difficulty

b. on litter or slatted floors, target stocking densities equal or below the required densities. Refer to Appendix E – *Stocking density.*

Force-feeding phase:

c. it is important to follow scientific advances in terms of housing of force-fed ducks and their biological demands. To keep improving, one should favor housing systems that allow animals to: stand normally, turn around without difficulty, defecate in a normal way, flap their wings, be able to preen and interact with other animals.

d. for force-fed ducks, rearing is done in individual or collective units. Allow a minimum space of 1200 cm^2 / duck in individual units or 1200 to 1500 cm^2 / duck in group units.

Generally:

e. consider reducing stocking densities of future flocks if recurring health and/or welfare problems occur and cannot be controlled by other practices.
f. consult a specialist (e.g. poultry veterinarian, breeder company representative, other qualified advisor) for guidance on managing stocking densities if problems arise

3.6 Nests (Duck Breeders)

The layout of the barns and ventilation patterns can affect female ducks' willingness to use nests for egg-laying.

Some of the factors affecting nest use in breeders include:

• ratio of birds to nests

• lighting

• ventilation

• type of nest

• placement of feeders and waterers in relation to nests

REQUIREMENTS

A sufficient number of appropriately-sized nests for the strain and number of females must be provided.

RECOMMENDED PRACTICES

a. provide one nest for every group of 3 to 5 females (28) (29) or as recommended by nest manufacturers' or breeders' guidelines when available.
b. maintain nests in a good state of repair and provide substrate

3.7 Hatching Egg Room Environment (at the farm)

Improper handling, storage, or incubation of hatching eggs can cause unhealthy embryo development and mortality. Maximum hatchability is obtained when eggs begin incubation within 7 days of being laid (7) (8).

Environmental factors during egg storage that affect hatchability and duck welfare include: storage time, storage temperature, relative humidity during storage, and flock age. Refer to the specific storage guidelines provided by the primary breeder for the strain.

REQUIREMENTS

Hatching eggs must be stored in ways that promote healthy embryos.

RECOMMENDED PRACTICES

a. coordinate egg storage temperatures with the hatchery
b. maintain egg storage temperatures at a constant level once the eggs have cooled
c. maintain relative humidity levels to prevent loss of humidity during storage
d. prevent cooler, heater, or humidifier fans from blowing directly on the eggs during storage.

Section 4 - Feed and Water

4.1 Nutrition and hydration

Feed and water are important for welfare because they contribute to overall bird health and well-being. Working with a qualified advisor (e.g. poultry nutritionist) can assist with ensuring birds are provided with nutritionally balanced diets. Nutrient composition, quantity, and availability of feed that is contaminant-free are all important components of the feed management system, as is access to feeders. Recording feed and water intake is an important practice, since increases or decreases in consumption can be an early indicator of problems.

The contamination of feed with mycotoxins poses a serious threat to the health and productivity of waterfowls (32) (33) (34) (35) (36). Generally, younger animals are more susceptible to the toxic effects of all mycotoxins.

REQUIREMENTS

Birds must be fed a diet appropriate to their age and genetics, and which contains adequate nutrients to meet their requirements for good health and welfare.

Ducks must have access daily to sufficient quantities of feed in normal conditions (some exceptions apply, refer to section 4.3).

Feed and water must be acceptable to birds and free from contaminants at a concentration hazardous to bird health.

Birds must be provided with fresh, potable water in sufficient quantities for normal hydration, health, and production. Interruptions for the purposes of vaccinations or water system maintenance or catching are acceptable under veterinary instructions.

Water must be tested at least annually, to ensure its suitability for the birds and corrective action must be taken as necessary.

Water must be monitored on an ongoing basis for any changes (odours, rust, cloudiness) that may suggest a change in quality.

RECOMMENDED PRACTICES

a. consult a nutritionist or other qualified specialist to ensure the diets meet the nutritional requirements of the birds
b. test feed when bird health or behaviour indicates that feed may be contaminated, or nutritional quality may be compromised
c. avoid any sudden changes in the quantity, form, or nutritional content of feed. Make dietary changes gradually and according to the recommendations of a nutritionist or other qualified specialist.
d. monitor all feed and water equipment for proper operation on a daily basis, and take corrective action promptly when necessary
e. adjust the height of feed and water equipment as the birds grow
f. use waterers that minimize spillage

g. watering systems must be designed to facilitate cleaning, limit bacterial growth and avoid accumulated biofilm.
h. flush, clean and sanitize watering equipment between flocks
i. ensure that water quality is protected through regular inspection and maintenance of water lines and devices
j. check open waterers daily and clean at least weekly
k. check water availability more frequently in hot or very cold weather
l. test water for water treatment chemicals (e.g. chlorine, peroxide), if used, at least monthly at the furthest point from the source at bird access level
m. test surface water sources or wells more frequently to detect potential fluctuations in water quality

4.2 Controlled Feeding for Duck Breeders.

For breeders, the growth of young ducks may be slowed down by feed restriction. This prevents early onset of laying and limits weight gain when the birds reach sexual maturity. (37) (38)

REQUIREMENTS

The body weight and uniformity of feed-restricted birds must be monitored.

RECOMMENDED PRACTICES

a. adapt the feeding regimen to promote uniformity of bird weight gain
b. when following a controlled feeding program to limit excessive weight gain, it is recommended to offer a quantity of feed that allows to meet weight gain recommended by the genetic company.

4.3 Controlled Feeding of Ducks in Preparation of Force-feeding Phase.

This type of feeding targets several objectives, one of these is to accustom the ducks to eat an important quantity of feed in a very short amount of time (this replicates a situation similar to force-feeding, it increases enzyme secretions which is necessary for good digestion.) The principle of feed restriction is to limit time of feed accessibility. It is common practice to use hourly controlled feeding. During controlled feeding, it is important to reduce gradually access time to the feeders. Another purpose of this practice is to stretch the oesophagus to create a pouch to store a large quantity of feed during force-feeding. The last purpose is to initiate the start of steatosis (fatty liver). It has been shown that a good preparation phase before force-feeding allows the liver to grow without any force-feeding. (31)

The phase of preparation to force-feeding (controlled feeding) is done during rearing unlike the force-feeding itself which is done in force-feeding units (individual or collective)

REQUIREMENTS

Birds must be prepared for force-feeding by gradually increasing the quantity of feed available to them a few days before starting force-feeding.

The body weight and uniformity of feed-restricted birds must be monitored.

When controlled feeding is used, any interruption of feed must not exceed 48 hours. (39)

RECOMMENDED PRACTICES

a. animals must be prepared for force-feeding one to two weeks before starting force-feeding
b. adapt the feeding regimen to promote uniformity of bird weight gain
c. during feed restriction programs, feed must be available for a minimum of 1 to 4 hours, refer to tables in Appendix F - *Feed Restriction Programs.*

4.4 Controlled Feeding of Ducks in Force-feeding Phase.

Force-feeding phase is the main concern in animal welfare. Force-feeding is done in force-feeding units (individual or collective). The requirements and recommended practices are intended to minimize the impact of this procedure on animal welfare.

REQUIREMENTS

Feed quantities given to each duck must match the duck's intake capacity.

Animals must be prepared for force-feeding by increasing gradually the quantity of feed given to them one to two weeks before the actual start of force-feeding.

The increase of food intake must be done gradually during force-feeding phase.

Force-feeding equipment must be designed and used so it does not cause injury or pain to the animals.

The shape and type of restraint equipment, the model and characteristics of cages shall prevent injury to the birds.

Force-feeding phase cannot exceed: 14 days for ducks kept in individual units and 21 days for ducks kept in collective units.

Follow advances in science and technology related to alternate ways for producing foie gras.

Have a written procedure outlining the proper way to force-feed, as well as the signs to watch for in a bird requiring special attention.

All personnel performing the force-feeding must be trained for the procedure and evaluated on their competence on a regular basis. (40)

RECOMMENDED PRACTICES

a. adapt the feeding regimen to serve 1 to 4 meals per day over a period of time.
b. during force-feeding stage, drain the waterer frequently for optimum water quality.
c. a written procedure should be prepared with a veterinarian familiar with this technique (40)

Section 5 - Flock Health Management

Disease control is an integral part of bird welfare. Good flock health management incorporates practices that are designed to optimize the health and welfare of waterfowls.

By monitoring, recording, and managing flock health producers are able to assess practices, to correct deficiencies and/or improve health and welfare outcomes.

Pain and discomfort caused by health issues impact bird well-being such that good welfare requires good health.

5.1 Flock Health Plan

An effective Flock Health Plan contributes to bird well-being by providing strategies for disease prevention, rapid diagnosis, and effective treatment.

Veterinarians play a key role in helping producers attain flock health objectives. While veterinarians are often called after animals are sick or injured, they can play a valuable role on a proactive basis by helping with the development and design of production systems and prevention practices and should be considered part of the flocks' health management team. Prevention of disease rather than treatment is better for bird welfare.

A poultry veterinarian can help develop a flock health plan.

A Flock Health Plan may include:

- observation of all birds for injury or signs of disease
- protocols for the prevention, detection, and treatment of disease or injury, including setting targets for measuring incidences of disease and injuries
    - protocols for individual bird or group identification and treatment records
    - protocols for managing sick or injured birds
    - vaccination protocols
    - protocols for dealing with internal and external parasites
    - protocols for culling birds, including at the end of production cycles
- protocols for on-farm biosecurity
    - protocols for monitoring visitors. Humans can transmit diseases to a flock of birds. (41).
    - protocols for introducing new birds to the flock
    - protocols for pest control. Isolating the flocks from other animals (e.g.: wild birds, rodents, insects, pets) reduces transfer of diseases. (41)
    - protocols for cleaning and disinfection will help prevent the transfer of a disease from one flock to the next one. (41)
- complete, accurate, and reliable record keeping
    - a record of deaths that occur on-farm for purposes of tracking mortality rates
- training programs and protocols for handlers

REQUIREMENTS

A working relationship with a veterinarian must be established.

RECOMMENDED PRACTICES

a. keep records on bird health
b. consult with a veterinarian when a disease is suspected
c. in case of suspected serious disease, contact a veterinarian immediately for a diagnosis
d. have a written protocol in case of emergency and self-quarantine

Refer to Appendix G : *Producer self-quarantine protocol*

5.2 Biosecurity Protocol

Biosecurity is the accepted term used to describe the measures needed to protect against the introduction and spread of diseases (42). An effective biosecurity program is based on two main concepts: i) Exclusion (keeping disease out of the flock) and ii) Containment (preventing disease spread within premises or to other flocks) (43). Consultation with a poultry veterinarian or a qualified advisor can assist with developing a biosecurity program to suit specific situations and needs (43).

Each poultry sector has developed comprehensive biosecurity standards, which include detailed sections on disease prevention that commercial producers are required to follow.

These protocols are based on the Canadian Food Inspection Agency's (CFIA) Biosecurity Standards. For non-commercial operations, refer to Appendix I: *Resources for Further Information* for references on developing a biosecurity program.

Biosecurity protocols can include:

- sign a visitor's log
- creating a perimeter around the area where birds are housed to limit the spread of disease
- managing the site with an «all-in/all-out» approach to facilitate effective cleaning
- the use of strict hygiene and sanitation procedures for all individuals who are in contact with the birds
- cleaning facilities and equipment to prepare for receiving birds
- developing a sanitation program for the premises, buildings, equipment, and vehicles
- allowing only necessary personnel in waterfowls' buildings. If it is necessary to enter more than one building, personnel should move from the youngest to the oldest birds, and from the healthiest to the least healthy birds (44)
- avoiding contact with poultry stock from other premises wherever possible, particularly on premises where strict sanitary measures are not enforced
- ensuring visitors are in compliance with the farm disease prevention or biosecurity protocols
- minimizing the movement of equipment and personnel between buildings
- wearing clean gloves or washing hands before handling birds
- changing or covering footwear upon entering poultry buildings

It is important to be aware of general clinical signs of disease in birds. Early detection can limit the impact of a disease outbreak (43).

People, including on-farm personnel and visitors, may inadvertently carry infectious agents into the poultry operation.

REQUIREMENTS

A biosecurity protocol must be developed and followed.

RECOMMENDED PRACTICES

a. review the biosecurity protocol regularly, and update as deemed necessary
b. ensure that all farm personnel are aware and understand their responsibilities in adhering to the biosecurity protocol.

5.2.1 Cleaning and Sanitation

Facilities and equipment need to be cleaned and sanitized regularly to prevent the accumulation of organic waste and potentially infectious agents in the birds' environments (41). When renovating or building new facilities, design buildings and choose materials to improve biosecurity practices together with cleaning and sanitation process.

Disinfectants are most effective when used on clean surfaces free of organic material.

If outdoor ranges are used, they also should be kept clean. It is beneficial to allow range areas to dry thoroughly prior to bird placement (41).

REQUIREMENTS

Buildings and equipment must be cleaned, and a disinfectant applied following an outbreak of an infectious disease.

RECOMMENDED PRACTICES

a. follow veterinary advice regarding downtime following the outbreak of a disease
b. clean and sanitize buildings and equipment between flocks.

5.2.2 Pest Control

Rodents, wild birds, and insects can carry infectious disease into poultry operations. Monitoring barns is an important step in preventing and/or controlling rodent populations (45). Damage caused by rodents takes many forms, including consumption and contamination of feed, as well as damage to buildings and insulation. Directly related to health, rodents are carriers of many diseases, which have an impact on biosecurity (45).

It is important to be able to recognize the signs of rodent infestation. Refer to Appendix I : *Resources for Further Information*. Given the extreme difficulty of eliminating rodents, prevention should be the primary

objective. Management programs that eliminate entrances, nesting sites, and food and water supplies (45) can help to reduce rodent numbers.

Fly control is important in poultry facilities due to possible spread of disease, mortality, and food safety concerns

A pest control plan can include:

- monitoring facilities for signs of pest infestation on a regular basis
- eliminating or reducing the number of places rodents can use for shelter (e.g. clutter, garbage, heavy vegetation around buildings)
- storing feed in rodent-proof containers; keep feed and garbage bins covered; prevent spillage; make structures rodent-proof
- preventing wild birds from entering barns (e.g. check and repair intake screens)
- keeping on-farm storage facilities for items such as bedding and crates dry and inaccessible to wild birds and other pests.

REQUIREMENTS

A plan to prevent and control pests including rodents, small animals, wild birds, insects, and predators must be developed and followed.

RECOMMENDED PRACTICE

a. deal with a professional pest control company

5.3 Protecting Bird Health

Preventing flock health problems is always preferable to having to deal with established problems. There are strategies available to maintain flock health and prevent illnesses (e.g. cleaning and sanitation, monitoring, biosecurity, vaccination, probiotics, medications).

RECOMMENDED PRACTICES

a. consult a veterinarian for a disease prevention program
b. ensure that personnel who work with ducks understand duck behaviour and can recognize obvious behavioural signs that indicate health problems and/or discomfort
c. be aware of potential regional or flock-specific risks to bird health that might require preventative measures

5.3.1 Health Monitoring

Regular monitoring is essential for the early detection and correction of any flock health or management issues

When inspecting the flock, personnel should look for:

- sick or injured birds
- abnormal respiratory sounds/open mouth breathing
- signs of lameness and inability to rise
- poor body condition
- poor feather condition or coverage
- behaviour
- distribution of birds throughout the barn
- access to and availability of feed and water
- proper operation of equipment
- litter quality and environmental conditions
- dead birds.

In addition, personnel should check for early signs of disease. These signs may include unexplained increases in mortality, or changes in feed/water consumption or egg production. Tracking the number of culls and the reason for doing so (e.g. sick, not eating, lame) can be helpful in identifying management practices that need to be improved.

REQUIREMENTS

Flock Inspections must be conducted daily.

Mortalities and culls must be recorded daily.

Cases involving unexpected illness, death, or increases in mortality rates must be investigated (e.g. consult a veterinarian, submit samples to a lab).

Dead birds must be removed and disposed of daily.

RECOMMENDED PRACTICES

a. increase frequency of inspections to at least twice daily.
b. if unexplained mortality in a barn increases within a 24-hour period, consult a veterinarian
c. monitor feed and water intake closely as early indicators of possible health issues
d. monitor birds for signs of lameness or immobility as early indicators of possible health issues. Consult a veterinarian to help identify possible causes, treatment, and/or strategies for prevention
e. check birds regularly for parasites. If parasites are detected, administer corrective treatment as soon as possible
f. conduct inspections in a manner that does not startle the birds

g. consult other advisors (e.g. hatchery, nutritionist, feed company representative, primary breeder company, other producers) as needed to address health issues related to flock management
h. maintain accurate flock management and health records (including unusual events such as illness or mortalities, weather events, equipment issues, etc.).

5.3.2 Managing Sick or Injured Birds

Flock owners, veterinarians, and laboratories are required to immediately report a bird that is infected or suspected of being infected with a reportable disease to a Canadian Food Inspection Agency (CFIA) District Veterinarian. Reportable diseases are listed in the Reportable Diseases Regulations under the Health of Animals Act

Refer to Appendix I: *Resources for Further Information.*

REQUIREMENTS

Sick or injured birds and birds that exhibit obvious signs of pain must be promptly treated or euthanized (refer to section 8: Euthanasia).

Birds that are severely lame must be treated or euthanized.

Any suspected cases of reportable diseases must be reported to a CFIA veterinarian immediately.

RECOMMENDED PRACTICES

a. monitor the progress of treated birds. If the initial treatment protocol fails, then reassess treatment options (seek veterinary advice), or euthanize
b. keep records to evaluate the success of treatment regimens for sick or injured birds.

5.4 Emergency Management and Preparedness

Emergency management protocols can protect the welfare of birds in the event of an emergency (e.g. power failure, fire, flooding, inclement weather).

Hatcheries and farms generally rely on automated equipment to maintain suitable conditions for hatching eggs, and ducks. They are therefore susceptible to risk during a power outage or equipment breakdown. It is advisable to have alarms to notify personnel of equipment malfunctions as well as generators to provide electricity in the case of a power outage.

Preparedness includes installation, maintenance, and testing of necessary equipment or systems, and personnel awareness. Refer to Appendix H : *Sample of Emergency Contact Template* that may be copied, completed, laminated, and posted in each barn.

REQUIREMENTS

A contingency plan for reasonably foreseeable problems that may affect bird welfare must be prepared and reviewed with all personnel.

Emergency contact information must be readily available.

At least one responsible individual must be available at all times to take necessary steps in the case of an emergency.

A backup power system or an alternate method must be available to ensure bird well-being during a power outage.

All alarms and fail-safe devices, including alternate power supply, must be regularly tested.

A monitoring system or surveillance procedure must be used to alert personnel of failures of critical systems such as heat or electricity.

RECOMMENDED PRACTICES

a. install and maintain the appropriate number of fire extinguishers in each building housing birds
b. ensure an adequate supply of feed and water is on hand in case of predicted extremes in weather (or other events) that might interrupt regular deliveries
c. develop a backup plan to make sure that water is readily available in case of interruptions in the water supply.
d. a monitoring system or surveillance procedure must be used to alert personnel of alarming conditions such as high/low temperatures or fire.

Section 6 - Husbandry Practices

6.1 Bird Handling

Correct handling methods are essential to prevent stress and injury.

To use proper handling techniques that meet the needs of waterfowl, it is important to have some concepts of physiology and duck welfare. Additional information is available in Appendix J – *Physiology and Welfare*, from Animal Welfare Training- Waterfowl Transport from AECOQ (78)

REQUIREMENTS

Birds must be handled at all times in such a manner that minimizes stress or injury. Birds must not be carried solely by the head, top of the neck, wings, tail feathers or the legs.

RECOMMENDED PRACTICES

Husbandry:

a. wear clothing of uniform appearance during the whole production cycle to minimize excitement of the birds when personnel enter the facilities
b. perform routine activities consistently
c. ensure that the movement of people and equipment within the barn is quiet and smooth
d. give an easily perceptible signal to the birds before entering the barn to prevent them from being startled. This practice is particularly important when the light intensity or noise is greater outside the barn than inside.

Herding and Loading:

a. there must be sufficient personnel on hand to ensure that the herding operation runs smoothly. (30)
b. ducks must be guided smoothly towards the mouth of the ramp, and the ducks guided gently to allow the smooth loading of the ducks into the transport coops. (30)
c. minimize the distance to reach the loading area
d. watch for signs and act to prevent over-crowding, such as if the ducks start piling or flapping their wings excessively (30)
e. maintain constant vigilance throughout loading to ensure that no ducks are injured (30)
f. recognise signs of distress in ducks and know how to care for these birds.
g. do not load unfit ducks that show signs of distress. A period of rest is usually enough to allow the duck to recover and be loaded. If the duck has not recovered after an hour, it is not likely that it ever will, it may need euthanasia. (1)

Catching and Carrying:

Catching

a. catching must be performed quietly, quickly, and smoothly with care to avoid unnecessary pain and distress to the ducks. (30)
b. catch ducks by the base of the neck or the body (30) (46) or by grasping both wings in one hand (47).

c. set the ducks free or support them, 20 seconds after being caught, (30)

Carrying

a. keep holding and carrying time to a minimum
b. when ducks are lifted by their necks for carrying, the action must be completed as a single, smooth motion. (30)
c. handle ducks with care. Ducks must be carried in an upright position, never upside down, by supporting the body weight to avoid injuries and distress when carrying them. (30)

6.2 Receiving and Brooding Ducks

Special care needs to be taken to ensure that newly-arrived ducklings settle in well to their new environments. They need to be protected from abrupt changes in temperature and be able to locate feed and water.

Feedback on duckling condition, mortality, and performance can help hatcheries evaluate their management and transport protocols.

Evaluation criteria could include:

- alertness: an alert duckling has wide-open bright eyes and appears curious
- vigour: a vigorous duckling is instantly active when disturbed and shows no sign of weakness
- condition: a duckling in good condition will be firm. The fluff will not be matted, there will be no signs of dehydration, and the navel will be healed. An unhealed navel can become an early access route for bacterial infections. Ducklings must be handled in order to be evaluated for condition
- body temperature: the normal body temperature for ducklings is 39,0-40,5 °C (102-105 °F). (17)
- behaviour: ducklings should not show signs of distress (e.g. open-mouth breathing, excessive vocalization)
- normalcy: a normal duckling has no apparent deformity or abnormality showing. Apparent abnormalities can be twisted toes or beak, crippled or straddled legs, etc.

REQUIREMENTS

Facilities must be prepared (i.e. heat, clean, feed, water, bedding) in advance of receiving ducklings so that they can be placed promptly after arrival.

Farm personnel must be present at the time of delivery and placement and must assess the physical condition of the ducklings.

Steps must be taken to prevent ducklings from becoming chilled or overheated during the unloading process.

All ducklings, as well as boxes with ducklings, must be kept, treated, and handled in ways that prevent injury and minimize stress.

Ducklings, as well as boxes with ducklings, must not be dropped from heights that may cause injury.

RECOMMENDED PRACTICES

a. a.do not drop ducklings from heights exceeding 15 cm (5.9 in) onto a hard surface or 30 cm (11.8 in) onto a soft surface
b. inspect ducklings immediately upon arrival. Document any problems and provide feedback to the hatchery
c. provide supplementary feed and water sources (e.g. trays or paper, jugs or bottles) to ensure that ducklings can locate feed and water easily
d. monitor ducklings to ensure that they can access feed and water
e. check ducklings more than twice daily during brooding.
f. increase the frequency of monitoring if any of the following are observed: piling, inactivity, high number of early mortality, or problems with equipment
g. prevent ducklings from crowding or piling on top of each other in the corners of floor pens
h. confirm brooding area temperatures at duckling level

6.3 Transferring Birds

Some birds may be moved between facilities (e.g. to grow-out or breeding or for force-feeding barns) on-farm or from other operations (Refer to section 7 : *Transportation*). This may be a stressful period for the birds.

Special care needs to be taken to ensure that newly-arrived birds settle in well to their new environments. They need to be protected from abrupt changes in temperature, be able to locate feed and water, and adapt to their new physical and social environments.

REQUIREMENTS

Housing facilities must be prepared (e.g. heat, feed, water) to receive birds in advance of their arrival.

Farm personnel must be present at the time of delivery and placement to assess the physical condition of the birds.

RECOMMENDED PRACTICES

a. inspect birds immediately upon arrival and monitor frequently to ensure that they adapt to their new physical and social environments and that they are able to locate and access feed and water
b. choose time of transfer according to the weather. Avoid moving birds during periods of extreme heat. Transferring birds as early in the day as possible will allow them to settle in.
c. avoid stresses such as vaccination or beak trimming in the days following or prior to transfer.

6.4 Reproductive Management: Duck Breeders

REQUIREMENTS

Growing, feeding, and lighting programs must be managed so that females reach maturity concurrent with or prior to males.

Social interactions between males and females must be monitored to avoid any distress or injury.

RECOMMENDED PRACTICES

a. raise males and females separate or together until sexual maturity
b. in natural mating, the ratio of females/males is approximately 4 /6 (48)

c. ensure that the vaccination programs of source groups are compatible before mixing birds. Consult your veterinarian

d. when necessary, introduce new males during production to maintain fertility levels in the flock

6.5 Reproductive Management: Semen collection and artificial insemination

Hybrids between Muscovy drakes and Pekin females are required for production of Mulard ducks. Reproduction is usually done by artificial insemination. Females in lay need to be handled gently at all times to protect their welfare and productivity.

REQUIREMENTS

Male and female ducks must be handled in such a way as to prevent injury and minimize stress throughout all aspects of the semen collection and artificial insemination processes.

RECOMMENDED PRACTICES

a) Females Muscovy ducks are used as «boutentrain» (teasers) to stimulate Muscovy males during the semen collection.

6.6 Hatching Egg Management

Proper handling and storage of hatching eggs is important to promote healthy embryo development and to minimize embryo mortality.

REQUIREMENTS

Hatching eggs must be handled and stored in ways that promote healthy embryos.

RECOMMENDED PRACTICES

a. collect eggs 2 to 4 times a day
b. protect eggs from unintended fluctuations in temperature
c. if needed, remove excess dirt off the eggs
d. dispose of cracked and excessively dirty eggs
e. tray eggs with the blunt end up
f. consult the hatchery before cleaning or sanitizing eggs. Use an approved protocol as soon as possible after collection.

6.7 Managing Harmful Behaviour

Feather pecking can be a problem in duck flocks, especially if it evolves into cannibalism. The underlying cause of this behaviour is poorly understood. However, there are several risk factors that may trigger outbreaks of feather pecking, especially if more than one contributing factor occurs at the same time (2) (49):

• moving ducks from one facility to another

• underweight or uneven flocks with large variations in bird weights

• stocking density

• changes in feed and/or nutritional deficiencies

• feed restriction

• changes in the environment: weather, sudden unexpected noises, equipment malfunctions, etc.

• disease and pest challenges, especially red mite and vermin

• changes in light intensity and lighting patterns.

Enrichment can play an important role in preventing and mitigating injurious feather pecking and cannibalism (50).

REQUIREMENTS

Action must be taken to manage bird behaviour at the onset of an outbreak of feather pecking or cannibalism.

RECOMMENDED PRACTICES

When outbreaks of feather pecking occur, investigate to find the causes (nutrition, feed, lighting, enrichment, genetics, stocking density, male/female ratio, beak treatment) that may contribute to feather pecking and cannibalism and make the necessary adjustments to the subsequent flocks.

6.8 Physical Alterations

To prevent outbreaks of feather pecking, ducks are often beak treated in hatcheries. There is less pain and fewer complications associated with initial beak treatments that are done early in life at the hatchery. (51) (52) (53)

Genetics and management may affect whether such alterations are of benefit for the specific birds on a given farm (11).

REQUIREMENTS

Beak trimming must be carried out only by competent persons

If beak treatment is necessary, the initial trimming must be done most preferably at the hatchery or, should be done at the latest on 20-day old ducks (54)

Equipment must be properly maintained and adjusted prior to performing any beak treatments.

RECOMMENDED PRACTICES

a. perform physical alterations early in life to reduce the risk and severity of secondary effects and to ensure the shortest recovery time
b. adopt management practices that reduce the need for physical alterations.

6.9 Controlled Moulting

Controlled moulting induced through feed and water deprivation is not practiced in Canada and is not recognized as a good production practice. However, in the event of a situation that endangers the survival of a strain or line, threatens the supply of hatching eggs, and consequently where the life of a breeder flock must be extended, controlled moulting may be undertaken on healthy birds under the supervision of a poultry veterinarian. Techniques that involve feed or water deprivation adversely affect the well-being of birds (55).

Methods other than extended feed and water deprivation are available for controlled moulting. Controlled moulting can be accomplished primarily with lighting programs and diet formulation.

REQUIREMENTS

Controlled moulting practices must be performed under veterinary supervision. Only healthy birds must be selected for moulting.

Feed or water must not be withdrawn to initiate moulting.

Section 7 - Transportation

Poultry transportation is a shared responsibility between all stakeholders. This Guide focuses on the aspects of the transportation process that take place on-farm and are thus under the control of the producer. Information regarding transportation of poultry beyond the farm gate is covered in the Recommended Code of Practice for the Care and Handling of Farm Animals: Transportation. Refer to Appendix I : *Resources for Further Information.*

It is recognized that by its very nature, the transportation process (which includes catching, loading, transporting, and lairage) includes stress and risk of injury (56).

The federal requirements for animal transport are covered under the Health of Animals Regulations, Part XII (Transportation of Animals) (13).

7.1 Evaluation for transport

Every effort should be made to only load birds that have the capacity to withstand the expected duration of the transport process. Incapacity may be due to injury, fatigue, poor health, distress, or any other cause. The welfare of the birds must be the first consideration. It is acknowledged that waterfowl producers often deal with large numbers of birds, which makes inspection of individual birds difficult.

During cool and cold conditions, appropriate procedures are needed if birds are wet to the extent that they lost their capacity to thermoregulate, to prevent hypothermia during transport (e.g. add litter to wet spots in the barn, fence off wet spots, adjust ventilation).

RQUIREMENTS

In preparation for transport, the flock must be evaluated for fitness and those birds that are deemed unfit for transport must be euthanized, separated, or transported with special provisions for veterinary assessment or treatment only.

Wet birds must not be loaded in cold weather if there is a risk that birds will become chilled.

RECOMMENDED PRACTICES

a. acclimatize housed birds gradually to cooler temperatures prior to catching and loading
b. record your transport decision making process
c. communicate with the transporter and/or processor about any changes in flock condition prior to loading
d. follow processors' guidance

7.2 Preparing for Loading and Transport

7.2.1 Pre-Loading Considerations

The welfare of birds can be adversely affected by delays. Stakeholders should adjust loading, departure, and transit times or routes to avoid potential delays.

Environmental conditions can significantly affect the comfort and welfare of birds during loading and transit. Handling procedures, loading densities, and time of loading may need to be adjusted accordingly.

REQUIREMENTS

The flock and environmental conditions, as well as the expected journey duration, must be taken into consideration when loading birds for transport.

The number of birds in each container must be determined prior to loading, taking into consideration the available container floor space, body size/weight, prevailing environmental conditions, and duration of transport.

RECOMMENDED PRACTICES

a. adjust time of day for loading to protect bird welfare when necessary (e.g. forecasted weather conditions, processor delays)
b. refer to tables of loading densities Appendix K: *Loading densities*
c. reduce loading densities during hot weather. Refer to Appendix L: *Humidex Guidelines for Loading Poultry.*

7.2.2 Feed and Water: Pre-Loading

Feed is typically withdrawn from birds ahead of transport to ensure that their digestive tracts are empty, to reduce the risk of contamination of carcasses during slaughter. Withdrawal times are usually determined by the processor. However, total withdrawal times should not be so excessive as to negatively affect bird welfare (i.e. hunger).

When planning feed removal on-farm, it is important to consider several factors that impact bird welfare, such as amount of time required to empty the gut prior to processing, amount of time required for catching and loading, distance to plant and expected duration of travel, expected lairage, and expected processing time. Length of time in transport without feed and water is covered under the Health of Animals Regulations, Part XII (Transportation of Animals) (13).

REQUIREMENTS

Pre-transport feed withdrawal must be managed to minimize the time that birds are off feed.

Water must be available to the birds until catching commences.

RECOMMENDED PRACTICES

a. avoid feeding birds at least 3 hours and preferably 5 hours prior to catching

7.2.3 Birds left in Barns

A daily inspection and culling program is an important part of flock management.

It will reduce culling prior to and after loading and improve the efficiency of the catching and loading processes. Despite pre-transport culling, there will likely be some birds that are deemed unfit for transport or non-saleable during catching and loading.

REQUIREMENTS

Birds that are not loaded for transport and not euthanized must continue to be cared for in accordance with relevant sections of this Guide (e.g. feed and water, temperature, ventilation).

7.3 Catching, Loading, and Unloading Procedures

Careful handling of birds during catching, loading, and unloading will reduce fear and minimize injuries to birds.

Waterfowls may have difficulty walking long distances. Waterfowls that are reluctant to walk are not necessarily lame and may simply need to rest.

REQUIREMENTS

Catching crews must be supervised by a competent individual.

Birds must be handled in such a manner that minimizes stress and/or injury.

Producer or a competent designee must be readily available to provide assistance throughout the catching and loading process.

All catching and loading equipment must be operated by competent personnel.

The catching area must promote safe and humane handling and catching.

Birds must be in an upright position after being loaded into containers.

Containers with birds must be handled, moved, and securely positioned on vehicles in a manner that minimizes stress and/or injury to birds

Birds must be loaded in containers in such a way that permits all of them to rest on the floor at the same time when evenly distributed, while preventing excessive movement within the container.

Parts of birds must not protrude from containers in any way that can cause injury or impede movement.

RECOMMENDED PRACTICES

a. ensure that a farm representative (e.g. owner, worker) observes the catching and loading process to ensure humane handling of the birds and intervenes as necessary
b. adjust barn fans and other equipment to prevent air from blowing on birds loaded on trucks in cold weather conditions
c. ensure that catching and loading take place in a timely and efficient manner to minimize bird stress
d. lower the light intensity where possible during catching to reduce stress on the birds
e. use corralling to control movement and prevent overcrowding of birds
f. locate containers as close to the birds as possible to minimize handling
g. ensure that birds are caught and carried appropriately
h. minimize passing of birds among handlers
i. monitor worker fatigue as it can negatively affect bird welfare
j. move waterfowls in small groups to help prevent piling and exhaustion
k. during hot weather, avoid loading during the hottest part of the day. When possible, arrange to load birds during the night
l. protect birds from becoming wet during loading and unloading in cold conditions

m. check the load and surrounding area for loose birds before the vehicle moves.

7.4 Catching and Loading/Unloading Equipment and Containers

It is important that the equipment and containers that are used and the procedures in place for loading and unloading birds minimize stress and/or injury to the birds.

REQUIREMENTS

The design, construction, space, state of repair, and use of containers and equipment must allow the birds to be loaded, conveyed, and unloaded in ways that minimize stress and/or injury.

Conveyors used for loading containers of live birds must prevent tilting of containers that causes birds to pile up.

RECOMMENDED PRACTICES

a. utilize containers that allow for continuous air flow.

7.5 Facilities Design and Maintenance

Proper building design and accessibility to transport vehicles greatly improves the humane handling of birds. This includes interior and exterior design, and maintenance of buildings, yards, and loading areas to facilitate loading and unloading of waterfowls at all times of the year and in all weather conditions.

REQUIREMENTS

When building new barns or renovating existing barns or yards, the way in which birds are moved into and out of barns must be taken into consideration with a view to facilitating safe and humane transfer of birds to and from the transport vehicles (e.g. tractor-trailer).

Openings through which birds are passed must be large enough to ensure that birds can be transferred in a way that minimizes injury.

Driveways and yards must be maintained to facilitate unobstructed, safe, and easy access by transport vehicles.

RECOMMENDED PRACTICES

a. consult with stakeholders (e.g. processors, catchers, transporters) when building new barns or renovating existing barns or yards to ensure that the facilities can safely accommodate vehicles and equipment
b. ensure that building design discourages transfer of birds between handlers
c. adapt building design to the catching and loading equipment used, and have sufficient number and size of doors or openings
d. maintain level and safe driveways and yards by regular grading, snow removal, and salting and/or sanding
e. ensure that loading/unloading areas, lighting, and equipment permit efficient and humane bird handling

f. design facilities to minimize the risk of birds getting wet during the loading process
g. protect doorways from falling ice and snow.

Section 8 - Euthanasia

Euthanasia is defined as the "ending of the life of an individual animal in a way that minimizes or eliminates pain and distress" (57). It is characterized by rapid, irreversible unconsciousness (insensibility), followed by prompt death (58) (59).

To alleviate pain and suffering when there is no reasonable prospect for recovery, euthanasia of birds is necessary.

Having a euthanasia decision-making process and providing training in euthanasia techniques can help ensure that necessary euthanasia is carried out in a timely manner. Protocols that include irreversible stunning of birds prior to the final kill step may assist in effective euthanasia.

8.1 Euthanasia at Hatcheries

Hatcheries euthanize ducklings that are injured, malformed, or suffering, and those otherwise unsaleable. Some unhatched eggs will contain live embryos that may need to be euthanized. Unhatched embryos that have passed the halfway point of incubation are sufficiently developed to be sensible to pain (5).

REQUIREMENTS

An acceptable method for euthanizing ducklings must be used. Refer to Appendix B **- Methods of Euthanasia.**

Eggs with the possibility of live embryos that have been culled must be euthanized. Refer to Appendix B ***:*** **Methods of euthanasia.**

8.2 Decision-Making around Euthanasia

It is important that everyone who works with birds be trained to recognize normal behaviour as well as signs of pain, injury, illness, and distress that indicate that euthanasia may be necessary.

It is important to euthanize without delay birds that:

- are unlikely to recover, or
- fail to respond to treatment and recovery protocols, or
- have signs of chronic, severe, or debilitating pain and distress, or
- are unable to access feed and water, or
- are unable to stand or walk, or
- show marked weight loss/loss of body condition.

Developing a euthanasia decision protocol can provide guidance for personnel in making consistent decisions on when birds need to be euthanized. Refer to Appendix N: *Example Euthanasia Decision Guidance*.

REQUIREMENTS

Personnel must be competent in making timely euthanasia decisions.

Sick or injured birds and birds that exhibit obvious signs of pain must be promptly treated or euthanized by competent personnel.

RECOMMENDED PRACTICES

a. have written guidelines to assist personnel in making decisions about euthanasia. Refer to Appendix N: *Example Euthanasia Decision Guidance*

8.3 Skills and Knowledge Related to Euthanasia

The successful application of any euthanasia method depends on many factors, including the competence and commitment of the personnel carrying out the procedure (57). Personnel who are tasked with euthanizing birds need to be trained and monitored periodically to ensure continued competence. Personnel need to understand the importance of timely and effective euthanasia in reducing animal suffering.

Not all personnel working with birds are suited to euthanizing birds or have the required physical strength or abilities. This may impact the efficacy of the euthanasia method. Operator fatigue may impact animal welfare (57). Attitudes towards euthanasia should be monitored to ensure that personnel are comfortable with the methods being used.

Training/competency includes but is not limited to methods of euthanasia, assessing insensibility and death, use and maintenance of equipment, and disposal of carcasses.

REQUIREMENTS

All individuals who perform euthanasia must be competent in the euthanasia methods and protocols used on-farm.

RECOMMENDED PRACTICES

a. develop euthanasia protocols and review them annually. Review protocols with personnel and update personnel on any changes resulting from annual reviews.
b. arrange for newly-trained employees who will be tasked with euthanasia to demonstrate their competence on dead birds before attempting a method on live birds
c. supervise employees until they are proven to be competent in their ability to euthanize birds in accordance with approved protocols
d. evaluate the abilities/competence of individuals who perform euthanasia on birds at least annually

8.4 Methods of Euthanasia

Many factors must be considered when selecting a method of euthanasia. Regardless of the method chosen, the determinant of success is whether the method can be consistently applied, and the bird loses consciousness rapidly, with minimal pain and distress.

When choosing a method of euthanasia, consider the following (adapted from 60):

- amount of pain and distress induced by the euthanasia method
- size or weight of birds
- amount of restraint required
- skill and comfort level of the person performing the specific euthanasia method; impact on personnel
- ready access to necessary equipment for timely euthanasia in all locations
- human safety
- carcass use and disposal.

REQUIREMENTS

An appropriate method for euthanizing birds, as contained in Appendix B :* Methods of Euthanasia *must be used.

Prior to being euthanized, birds must be handled in a manner that minimizes pain, suffering and anxiety.

All equipment used for euthanasia must be well maintained, used correctly, and not overloaded, so that it operates effectively and efficiently.

RECOMMENDED PRACTICES

a. have a backup euthanasia method readily available
b. clean euthanasia equipment as needed to maintain its efficacy
c. evaluate causes of ineffective euthanasia (e.g. operator error, equipment failure) and take remedial action.

8.5 Confirmation of Insensibility and Death

Death may not occur immediately but is the result of eventual respiratory and cardiac failure, which can take several minutes (60). It is therefore essential that birds be swiftly rendered insensible and remain so until death. For this reason, euthanasia methods that affect the brain first are preferred (55).

Immediate application of the same or an alternate approved euthanasia method is required when signs of sensibility are observed. Signs of sensibility include:

- bird blinks when the surface of the eye is touched (corneal reflex)
- rhythmic breathing (check for abdominal movement in the vent area)
- vocalization (other than an exhalation that occurs as the lungs deflate)

Absence of these signs indicates that the bird is insensible. Death is confirmed by cessation of breathing and heartbeat. It is not necessary to assess for sensibility or confirm death when maceration or decapitation is used due to the proven consistency of these methods.

REQUIREMENTS

Birds must be inspected for signs of sensibility after the euthanasia method has been applied.

If signs of sensibility are observed after the application of a euthanasia method, a second application of the euthanasia method or an alternate method must be immediately administered.

Death must be confirmed before leaving birds and disposing of carcasses.

Section 9 - Mass Depopulation

Mass depopulation refers to killing entire flocks or large numbers of birds. Typically, mass depopulation on-farm is an infrequent practice; however, in some cases, large numbers of birds are required to be depopulated on-farm in an emergency such as a disease outbreak or natural disaster. In addition, unexpected events (e.g. labour or market disruptions, extreme weather, food safety) as well as routine end-of-production breeder flock termination (e.g. no access to local processor) may necessitate depopulating entire flocks or large numbers of birds in one event.

In some cases, government representatives may be involved in the decision-making and depopulation processes. Depopulating an entire flock or group of birds may employ euthanasia techniques but the techniques used for mass depopulation must also respect the following requirements: rapid unconsciousness (insensibility), followed by prompt death, and no return to sensibility before death. The methods employed for depopulating large numbers of birds need to be as humane as possible given the situation.

A plan for depopulating entire flocks or large numbers of birds provides guidance in the event of a disease outbreak or other unexpected disaster. Plans will need to be reviewed regularly and updated as needed as new and better methods are developed and approved.

The depopulation plan should include (adapted from (61)):

• depopulation method(s)

• biosecurity considerations

• identification of appropriately trained individuals to oversee and participate in the process

• reporting procedures to designated authorities

• safety procedures for personnel.

Those individuals who are involved with depopulating large numbers of birds, particularly when the birds are healthy, can suffer from emotional stress (62). Moreover, individuals may encounter physical fatigue, especially when physical methods are used. Both types of stress can have a negative impact on bird welfare during the depopulation event.

REQUIREMENTS

A mass depopulation plan must be available or accessible.

If not using a method listed in Appendix B :* Methods of Euthanasia*, methods for depopulating large groups of birds on-farm must be undertaken in consultation with a veterinarian.

Individuals who are involved in mass depopulation must be competent in the methods used.

All equipment used for depopulating birds must be maintained in good working order.

Death must be confirmed before disposal of birds.

RECOMMENDED PRACTICES

a. consult a veterinarian when developing the farm protocol for mass depopulation

b. conduct a planning discussion with personnel to coordinate activities, review safety practices and expectations, etc. prior to scheduled mass depopulation event

c. designate one competent individual who is knowledgeable about the procedure(s) being used and the associated risks to oversee the event

d. coordinate observation by qualified and competent individuals, if mass depopulation is a first or infrequent event, to review and provide feedback on the impact of welfare outcomes

e. develop a plan in advance of each mass depopulation event for the appropriate disposal of carcasses.

Cited References

1. National Farm Animal Care Council (2014), Code of Practice for the Care and Handling of Pigs, Glossary, Distressed pigs.
2. American Veterinary Medical Association Animal Welfare Division (2010) Literature Review on the Welfare Implications of Induced Molting of Layer Chickens. Available at: https://www.avma.org/KB/Resources/LiteratureReviews/Documents/induced_molting_layer_chickens_bgnd.pdf Accessed: January 7, 2018.
3. Canadian Food Inspection Agency (CFIA) (2015) Glossary of Terms. Food Safety Enhancement Program Manual . Available at : www.inspection.gc.ca/food/safe-food-production-systems/food-safety-enhancement-program/program-manual/eng/1345821469459/1345821716482?chap=1 Accessed : January 7, 2018.
4. de Jong I., Berg C., Butterworth A. & Estevez I. (2012) Scientific Report updating the EFSA Opinions on the Welfare of Broilers and Broiler Breeders. s.l.: European Food Safety Authority.
5. Romanoff A.L. (1960) The Avian Embryo: Structural and Functional Development. New York NY: The Macmillan Co.
6. Tullett S. (2009) Investigating Hatchery Practice, Management Manual. Newbridge: Aviagen.
7. Bradley F., Cardona C., Ernst R., Hullinger P., Jeffrey J. and Mench, J. Muscovy Duck Care Practices, California Poultry Workgroup, University of California – Cooperative Extension, p.4. http://animalsciencey.ucdavis.edu/avian/muscovy1001.htm , Accessed: January 7, 2018
8. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012). Production de canards. Quae Editions. p.174-175
9. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012). Production de canards. Quae Editions. p.178
10. Schwean-Lardner K., Anderson D., Petrik M., Torrey S. & Widowski T.M. (2013) *Code of Practice for the Care and Handling of Chickens, Turkeys and Breeders: Review of Scientific Research on Priority Issues.* Lacombe AB: National Farm Animal Care Council.
11. Widowski T.M., Classen H., Newberry R.C., Petrik M. & Schwean-Lardner K. (2013) *Code of Practice for the Care and Handling of Pullets, Layers, and Spent Fowl: Poultry (Layers): Review of Scientific Research on Priority Issues.* Lacombe AB: National Farm Animal Care Council.
12. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012). Production de canards. Quae Editions. p.76
13. Government of Canada: Department of Justice (2015) Health of Animals Regulations Part XII: Transportation of Animals. Available at: http:// laws-lois.justice.gc.ca/eng/regulations/C.R.C.%2C_ch_296/page-16.html#h-70. Accessed: January 7, 2018.
14. EFSA Panel on Animal Health and Welfare (AHAW) (2001) Scientific Opinion Concerning the Welfare of Animals during Transport. EFSA Journal 9: 125.
15. Noy Y. & Sklan D. (1998) Yolk utilisation in the newly hatched poult. British Poultry Science 39: 446-451
16. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012). Production de canards. Quae Editions. p.181.
17. Steen JB, Gabrielsen GW (1998). The development of homeothermy in common eider ducklings, Acta Physiol Scand, Apr;132(4), 557-561
18. Code of Practices transport (2001) National Farm Animal Care Council, Canada http://www.nfacc.ca/codes-of-practice/transportation Accessed: January 7, 2018
19. Cornell University, www.duckhealth.com Accessed: January7, 2018
20. PHE Centre for Radiation, Chemical and Environmental Hazards (2015) Ammonia-Toxicological Overview. London: Public Health England.
21. Centre de Référence en Agriculture et Agroalimentaire du Québec (2005). Le canard et l'oie : Guide d'élevage, 128 pages. p.74
22. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012). Production de canards. Quae Editions. p.115
23. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012). Production de canards. Quae Editions. p. 110
24. Schwean-Lardner K., Fancher B.I., Gomis S., Van Kessel A., Dalal S. & Classen H.L. (2013) Effect of day length on cause of mortality, leg health, and ocular health in broilers. Poultry Science 92: 1-11.
25. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012). Production de canards. Quae Editions. p.19
26. Grimaud Frères Grimaud Frères Sélection (2017), Guide d'élevage Canedins à foie gras,18 pages. p.8
27. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012). Production de canards. Quae Editions. p.186

28. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012). Production de canards. Quae Editions. p.114.
29. Bradley F., Cardona C., Ernst R., Hullinger P., Jeffrey J. and Mench, J. Muscovy Duck Care Practices, California Poultry Workgroup, University of California – Cooperative Extension, p.6. http://animalsciencey.ucdavis.edu/avian/muscovy1001.htm , Accessed: January 7, 2018.
30. American Humane Farm Program. Meat Ducks (Common /Domestic Ducks). Animal Welfare Standards Audit Tool. Supplemental Animal Welfare Standards Audit Tool for Transport and Processing Plant Audit. Accessed: January 7, 2018. http://www.humaneheartland.org/index.php?option=com_content&view=article&id=3&Itemid=106&jsmallfib=1&dir=JSROOT/Animal+Welfare+Audit+Tools&download_file=JSROOT/Animal+Welfare+Audit+Tools/Meat+Ducks+Audit+Tool.pdf
31. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012) Productions de canards, Éditions Quae, p.200-201
32. Cheng Y.H., Chang M.H., Lin Y.A., Wu J.F. and Chen B.J. (2004) Effects of deoxynivalenol and degradation enzyme on growth performance and immune responses in mule ducks. Journal of Animal and Feed Sciences, 13, 275−287 275.
33. Dänicke S., Ueberschär K.-H., Valenta H., Matthes S., Matthäus K. & Halle I. (2004) Effects of graded levels of Fusarium-toxin-contaminated wheat in Pekin duck diets on performance, health and metabolism of deoxynivalenol and zearalenone, British Poultry Science, 45:2, 264-272.
34. Davis G.S., Anderson K.E., Parkhurst C.R., Rives D.V. and Hagler W.M., (1994). Mycotoxins and feed refusal by pekin ducks. Journal of Applied Poultry Science Res. 3:190-192.
35. Guerre Philippe, (2015), Fusariotoxins in Avian Species: Toxicokinetics, Metabolism and Persistence in Tissues. Toxins, 7, 2289-2305.
36. Tardieu Didier, Bailly Jean-Denis, Guerre Philippe (2007), Toxicocinétique de la Fumonisine B1 chez le canard mulard et risque de contamination des productions au cours du gavage. Progrès et perspectives de la recherche sur les mycotoxines de Fusarium dans les céréales. P101-102.
37. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012). Production de canards. Quae Editions. p.165.
38. Olver M. D. (1995) Effect of restricted feeding during the rearing period and a “forced moult” at 40 weeks of production on the productivity of Pekin breeder ducks, British Poultry Science, 36:5, 737-746
39. Grimaud Frères Grimaud Frères Sélection (2017). Guide d’élevage Canedins à foie gras, 18 pages p.13
40. Conseil du bien-être des animaux de Belgique, 2014, Rapport Scientifique, Production de foie gras. 139 pages
41. Beutler A. (2007) Poultry Health and Disease Fact Sheet. Ministère de l’Agriculture de la Saskatchewan. Disponible à : http://www.agriculture.gov.sk.ca/Poultry_Health_Disease. Accessed : November 17, 2014.
42. Canadian Food Inspection Agency (CFIA) (2014) General Producer Guide - National Avian On-Farm Biosecurity Standard. Available: www.inspection.gc.ca/animals/terrestrial-animals/biosecurity/standards-and-principles/general-producer-guide/eng/1398640321596/1398640379048?chap=0. Accessed: January 17, 2018
43. Sanei B. & Innes P. (2012) Biosecurity Recommendations for Commercial Poultry Flocks in Ontario. Ontario Ministry of Agriculture, Food and Rural Affairs. Available at:www.omafra.gov.on.ca/english/livestock/poultry/facts/05-077.htm. Accessed: August 31, 2015
44. United Egg Producers (2014) Animal Husbandry Guidelines for U.S. Egg laying Flocks. s.l.: United Egg Producers.
45. Lang B., Dam A. & Taylor K. (2013) Rodent Control in Livestock and Poultry Facilities. Ontario Ministry of Agriculture, Food and Rural Affairs. Available at: www.omafra.gov.on.ca/english/livestock/dairy/facts/13-057.htm. Accessed: August 31, 2015.
46. Humane Slaughter Association, United Kingdom, Online Guide- Practical Slaughter of Poultry-Catching and handling-Ducks. https://www.hsa.org.uk/catching-and-handling/ducks Accessed: January 7, 2018.
47. Department of Primary Industries, Australia, Animals& Livestock-Poultry and birds-Poultry Species- Brooding and rearing ducks. Accessed: January 7, 2018. https://www.dpi.nsw.gov.au/animals-and-livestock/poultry-and-birds/species/duck-raising/brooding-and-rearing
48. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012). Production de canards. Quae Editions. p.166
49. Department for Environment, Food and Rural Affairs (DEFRA) (2005) A Guide to the Practical Management of Feather Pecking & Cannibalism in Free Range Laying Hens. London EN: DEFRA Publications.
50. Edwards L.N. (2010) Animal Well-being and Behavioural Needs on the Farm. In: Improving Animal Welfare-A Practical Approach. (Temple Grandin, ed.) Cambridge MA: CAB International, p. 152.
51. Hughes B.O. & Gentle M.J. (1995) Beak trimming of poultry: its implications for welfare. World's Poultry Science Journal 51: 51-61.

52. Gentle M.J., Thorp B.H. & Hughes B.O. (1995) Anatomical consequences of partial beak amputation (beak trimming) in turkeys. Research in Veterinary Science 58: 158-162.
53. Gentle M.J., et coll. (1997) Behavioural and anatomical consequences of two beak trimming methods in 1- and 10-d-old domestic chicks. British Poultry Science 38: 453-463.
54. Grimaud Frères Grimaud Frères Sélection (2017). Guide d'élevage Canedins à foie gras, 18 pages. p.9
55. Canadian Veterinary Medical Association (CVMA) (2009) Forced Moulting of Poultry - Position Statement. Available at: www.canadianveterinarians.net/documents/forced-moulting-of-poultry . Accessed: June 20, 2015.
56. Mitchell M.A. & Kettlewell P.J. (1998) Physiological stress and welfare of broiler chickens in transit: Solutions not problems! Poultry Science 77: 1803-1814.
57. American Veterinary Medical Association (AVMA) (2013) AVMA Guidelines for the Euthanasia of Animals. Schaumburg IL: American Veterinary Medical Association.
58. Canadian Veterinary Medical Association (CVMA) (2014) Euthanasia - Position Statement. Available at: www.canadianveterinarians.net/documents/euthanasia . Accessed: April 8, 2015.
59. Government of Ontario (2015) Ontario Society for the Prevention of Cruelty to Animals Act. ServiceOntario e-Laws. Available at: www.e-laws.gov.on.ca/html/regs/english/elaws_regs_090060_e.htm. Accessed: April 7, 2015.
60. Woods J., Shearer J.K. & Hill J. (2010) Recommended On-farm Euthanasia Practices. Dans: Improving Animal Welfare - A Practical Approach. (Temple Grandin, ed.) Cambridge MA: CAB International, pp. 186-213.
61. World Organisation for Animal Health (OIE) (2014) Terrestrial Animal Health Code Chapter 7.6 - Killing of Animals for Disease Control Purposes. Available at: www.oie.int/index.php?id=169&L=0&htmfile=chapitre_aw_killing.htm. Accessed: January 12, 2014.
62. Whiting T.L. & Marion C.R. (2011) Perpetration-induced traumatic stress — A risk for veterinarians involved in the destruction of healthy animals. Canadian Veterinary Journal 52: 794-796.
63. Pingel, Heinz, Gérard Guy and Élisabeth Bazéa (2012). Production de canards. Quae Editions. p.111
64. Dean W., Sandhu T. Duck Housing and Management. (2014) Feeders and feeding space. Cornell University https://ahdc.vet.cornell.edu/Sects/duck/housing.cfm , Accessed: February 8, 2018
65. Salichon Y.(1990) Quelques caractéristiques de la production du canard de Barbarie en France. In : Sauveur B. (ed). L'aviculture en Méditerranée. Montpellier : CIHEAM, p.120
66. Grimaud Frères Grimaud Frères Sélection (2017). Guide d'élevage Canedins à foie gras, 18 pages. p.10
67. Centre de Référence en Agriculture et Agroalimentaire du Québec (2005). Le canard et l'oie : Guide d'élevage. 128 pages p.77
68. Orvia (2015) Guide d'élevage CC, Stimul MG AS, Conditions traditionnelles, Conseils particuliers pour l'élevage des mulards-densité 16 pages. P.6
69. Grimaud Frères Grimaud Frères Sélection (2017), Guide d'élevage Canedins à foie gras, 18 pages. P.6; Grimaud Frères Grimaud Frères Sélection (2016), Guide d'élevage Mulard à rôtir, 29 pages.p.5; Grimaud Frères Grimaud Frères Sélection (2016), Guide d'élevage Canard Pékin à rôtir, 19 pages. P.6.
70. Centre de Référence en Agriculture et Agroalimentaire du Québec (2005). Le canard et l'oie : Guide d'élevage.128 pages. p.113-114
71. Bowes V. (2014) Appendix C - Producer Self-Quarantine Protocol. General Producer Guide - National Avian On-Farm Biosecurity Standard. Available at: www.inspection.gc.ca/animals/terrestrial-animals/biosecurity/standards-and-principles/general-producer-guide/eng/1398640321596/1398640379048?chap=10. Accessed: April 7, 2015.
72. L'Association des Éleveurs de canards et d'oies du Québec (AECOQ), 2016, Formation Bienêtre Animal Transport des palmipèdes, 122 pages, pages 28-42, 80-84.
73. National Turkey Federation (2012) Animal Care Best Management Practices: Production Guidelines. Washington DC: s.n.
74. National Turkey Federation (2013) Animal Care Best Management Practices: Euthanasia Guidelines. Washington DC: National Turkey Federation.

Appendix A - Sample Waterfowl Welfare Policy

Sample Waterfowl Welfare Policy

[Your Farm/Company]
Employee Animal Care Code of Conduct

Our commitment to our animals

[Our company/farm] is committed to responsible farm animal care and handling. That means animals in our care deserve to be healthy, safe and well cared for.

Our commitment to our customers

Working with animals is important work that we take seriously. We are proud of the work that we do, and we strictly enforce responsible farm animal care and handling among employees and service providers at our facility.

Every person who handles or come into contact with an animal is required to support our core objective of responsible farm animal care and handling. The demonstration of that support is through the review and signing of this Code of Conduct agreement on a **[quarterly/annual]** basis.

Our commitment to our employees

Your job is valuable and important to our animals, and our business. When you report an incident involving possible mistreatment, illness or injury involving one of our animals, we will take it seriously. We will document your concern. We will follow up to resolve the animal's situation, and/or provide additional training among employees.

Our employees' commitment to us

Every one of our employees is required to handle and treat animals with respect and in accordance with [farm/company] policies and rules as well as the federal, provincial and municipal regulations under which we operate.

Any employee who is responsible for, observes or receives any information that alleges an animal on our property or in our care is being mistreated, mishandled or treated or handled in a way that is contrary to our animal care policy/guidelines must report that information to **[NAME OF POINT PERSON]** immediately so that the situation can be corrected. **[PROVIDE CONTACT INFO]**.

Failure to adhere to this agreement is cause for dismissal. **[Farm/company]** reserves the right to refer animal-abusers to law enforcement for prosecution.

I, _____, understand and acknowledge that willful neglect, mishandling or abuse of animals by [name of company] employee or witnessing it and not reporting it is subject to discipline including immediate termination of employment, and that offenders may also be subject to prosecution under applicable laws.

Appendix A - Sample Waterfowl Welfare Policy (continued)

_____	_____
Signature of Employee	Date
_____	
Name (Please Print)	
_____	_____
Signature of Employer	Date
_____	_____
Name (Please Print)	Title

Important Note: Seek advice from your legal counsel and human resources department if appropriate to ensure any agreement meets relevant labour laws and union contracts.

Appendix B - Methods of Euthanasia

The following chart lists acceptable methods of euthanasia of individual birds1 for use on-farm and at hatcheries, as well as methods that are only considered acceptable with the noted conditions. The chart is based on the information that was available at the time of publishing. Further peer-reviewed research may result in new, acceptable equipment and/or euthanasia methods, or the elimination of some currently accepted practices. For any method to be considered acceptable, it must result in rapid loss of sensibility and the bird must not return to sensibility prior to death. Therefore, when physical methods are used, those methods that result in immediate, severe, and irreversible damage to the brain are preferred (57). Effectiveness of all euthanasia methods may be compromised by operator fatigue when euthanizing large numbers of birds.

When equipment is used for euthanasia, it must be properly maintained, proven effective for the size and species of bird it is used for, and used in accordance with manufacturers' instructions, if applicable.

Individuals who euthanize birds must be competent in the appropriate methods, and in some cases a high level of technical skill is required. Some euthanasia methods may result in operator injury if used improperly.

Euthanasia Method	Acceptability by Bird Type	Conditions	Comments
On-Farm			
Anesthetic Overdose	Acceptable: **All Birds**	Administered under the direction of a licensed veterinarian only	Carcasses may be dangerous to scavengers and should not be submitted for normal rendering
Non-Penetrating Captive Bolt Penetrating Captive Bolt	Acceptable with Conditions: ➡ All Birds	Correct placement of the device on the head is critical Humane restraint methods (e.g. 2 people, appropriate restraint device) may be necessary Use devices approved for poultry	May be more appropriate for large birds

Euthanasia Method	Acceptability by Bird Type	Conditions	Comments
Manual Blunt Force Trauma	Acceptable with Conditions: ➞ All Birds	Humane restraint methods (e.g. 2 people, appropriate restraint device) are necessary The impact must be of sufficient force and accurately placed in order to result in immediate insensibility and death in a single blow	Alternative methods should be considered (e.g. non-penetrating captive bolt) due to the potential for incorrect application
Decapitation	Acceptable with Conditions: ➞ All Birds	Instrument must be sharp and of appropriate size Procedure must be carried out in one quick motion and result in a complete severance of the head Requires secure restraint of the bird	Need for environmental sanitation (blood) Risk of disease transmission via blood
Gas Inhalation: Nitrogen (N)	Acceptable with Conditions: ➞ All Birds	Requires specially-designed closed chamber to contain gas and ensure that oxygen levels remain below 5% Use pure nitrogen; do not use in mixtures with other gases	Not commonly used on-farm May reduce respiratory distress during loss of sensibility compared to other gases Birds may become sensible if gas concentration is not sufficiently high and if oxygen levels are not low enough. This may be difficult to achieve in an on-farm setting. Birds may experience convulsions before becoming insensible Birds should be placed in the chamber in a single layer. Avoid piling.

Euthanasia Method	Acceptability by Bird Type	Conditions	Comments
Gas Inhalation: Carbon Dioxide (CO_2)	Acceptable with Conditions: ➡ All Birds	Requires specialized equipment (pressure-reducing regulator, CO_2 cylinder or tank) and a closed chamber to contain gas Gas must be supplied in a precisely regulated and purified form without contaminants or adulterants (5) Requires specially-designed closed chamber to contain gas and ensure that oxygen levels remain below 5%	May cause brief periods of distress before birds become insensible Birds should be placed in the chamber in a single layer. Avoid piling. Use in a well-ventilated area for operator safety
Gas Inhalation: Carbon Monoxide (CO)	Acceptable with Conditions: ➡ All Birds	Requires specially-designed closed chamber to contain gas, along with a regulator and flow meter	Dangerous to operators and potentially explosive at high concentrations; therefore, producers are encouraged to find an alternative to CO gassing Use in a well-ventilated area for operator safety Birds should be placed in the chamber in a single layer. Avoid piling.
Cervical Dislocation[2]			
i) Manuel	Acceptable with Conditions: ➡ All Birds	Crushing of the neck bones is unacceptable prior to loss of sensibility This method is restricted to smaller birds (e.g. ≤ 3 kg), although this may vary depending on operator ability	Performed correctly, cervical dislocation results in the luxation (dislocation) – never crushing – of the cervical vertebrae Alternative methods should be considered (e.g. non-penetrating captive bolt) as in some classes of poultry there is evidence that cervical dislocation may not cause rapid loss of sensibility The site of the dislocation should be as close to the head as possible Cervical dislocation is difficult to perform correctly in large birds, and therefore
ii) Mechanical	Acceptable with Conditions: ➡ All Birds	Crushing of the neck bones is unacceptable prior to loss of sensibility Device must be purpose-designed and appropriate for the size of bird	

			may not result in immediate loss of sensibility. It is recommended that larger birds be rendered insensible prior to applying cervical dislocation
Maceration	Acceptable with Conditions: ➡ Ducklings < 72 hours	Must use properly maintained, proven effective, purpose-designed equipment that results in instantaneous and complete maceration	The number of birds/eggs entering the equipment at one time can influence the effectiveness of the equipment (10)

Euthanasia Method	Acceptability by Bird Type	Conditions	Comments
Hatcheries : Ducklings and unhatched ducklings (>50 % of incubation)			
Decapitation	Acceptable: Unhatched ducklings and ducklings	Instrument must be sharp and of appropriate size Procedure must be carried out in one quick motion and result in a complete severance of the head Requires secure restraint of the head	Need for environmental sanitation (blood) Risk of disease transmission via blood Effective application may be compromised if operator is fatigued or large numbers of birds are to be euthanized
Gas Inhalation: Carbon Dioxide (CO_2)	Acceptable with Conditions:➡ Unhatched ducklings and ducklings	Requires specialized equipment (pressure-reducing regulator, CO_2 cylinder or tank) and a closed chamber to contain gas. Gas must be supplied in a precisely regulated and purified form without contaminants or adulterants (44) Use and maintain equipment according to manufacturers' instructions, if applicable Maintain equipment in good working order	May cause brief periods of distress before birds lose consciousness Prolonged exposure is required because they are resistant to CO_2 (57) Birds should be placed in the chamber in a single layer. Avoid piling. Must be used in a well-ventilated area for operator safety
Manual Cervical Dislocation	Acceptable with Conditions:➡ ducklings	Crushing of the neck bones is unacceptable for conscious birds	Alternative methods should be considered due to difficulty in checking for insensibility with very young ducklings Performed correctly, cervical dislocation results in the luxation (dislocation) –

			never crushing – of the cervical vertebrae The site of the dislocation should be as close to the head as possible
Maceration	Acceptable with Conditions:➡ Unhatched ducklings and ducklings	Must use properly maintained, proven effective, purpose-designed equipment that results in instantaneous and complete maceration	The number of birds/eggs entering the equipment at one time can influence the effectiveness of the equipment (10)

Appendix C - Recommended Feeder and Drinker Spaces for Ducks

Basic guidelines for feed and water access for ducks. Manufacturers' recommendations, wherever available, should take precedence over this table. Based on free-choice feed availability. Always monitor uniformity of bird access to feed and water and adjust as necessary.

Feed	
1 to 3 weeks 4 to 8 weeks 9 weeks on (63)	1 to 1,5 cm of trough access / duck 2 to 3 cm of trough access / duck 4 cm of trough access / duck
First 3 weeks During controlled feeding of breeders (64)	2,5 cm of trough access / duck 10 cm of trough access / duck
Water	
1st week 2nd week thereafter (65)	1 drinker / 50 ducks 1 drinker / 100 ducks 1 drinker / 150 ducks
Start-up thereafter (66)	1 round drinker / 50 to 60 ducklings 1 nipple / 5 ducklings or 1 round drinker (Plasson type) / 150 to 200 ducklings

a. Take bird weight/size into consideration
b. Assumes that both sides of the trough are available to the birds. If not, then double the space allocation per bird
c. Perimeter space for round feeders and waterers can be calculated by multiplying linear trough space by 0.8.
d. A combination of drinking troughs can be used

Appendix D - Lighting Program Examples

Manufacturers' recommendations, wherever available, should take precedence over these examples.

Important note: these programs must provide distinct day and night cycles allowing normal activities during the light cycle and rest during the nocturnal phase. The only exception to this is for the first 24 hours, which should be a light phase only, allowing the newly arrived ducklings to get used to their environment and find their food and water quickly.

Example of lighting program for duck breeders (65)

Age or growth period	Duration of light / day
First days	24 hours
1st week	20 hours
2nd week	16 hours
3rd week	12 hours
4th week	8 hours
5th week	9 hours
6th week	10 hours
Thereafter until onset of lay	Increase by 30 minutes per week (an increase of 15 minutes / week does not provide enough stimulation)
Breeding period	14 to 16 hours

Appendix D (continued)

Example of lighting program for meat ducks and/or foie gras ducks (66)

Age or growth period	Intensity in lux	Intensity in watts/m^2	Duration of light / day
1st week	60 to 80 lux	7.2 to 9.6 watts/m^2	24 hours
2nd et 3rd weeks	30 lux	3.6 watts/m^2	Gradual decrease from 24 to 16 hours
4th week until slaughter	10 lux (for an efficient lighting program the difference in light intensity between light and dark periods must be sufficiently large)	1.2 watts/m^2	14 hours

Appendix E - Stocking Densities

Maximum stocking densities for all types of ducks (67) (68) (69)

On littered floors	On slatted floors
3 to 5 ducks / m^2	8 to 10 ducks / m^2
22,5 kg / m^2	45 kg / m^2

Appendix F - Example of a Controlled Feeding Program

Scheduled Controlled feeding (70)	
Age	**Method**
Around 8 to 9 weeks up to 12 weeks	2-hour meal (meets 90% of daily food requirements, ±185g/day)
5 days before onset of force-feeding	Full consumption (±350g in a maximum of 1 meal)

Appendix G - Producer Self-Quarantine Protocol

This protocol (71) presents to the producer a course of action during the suspicion of an infectious disease. This plan is an excellent example of procedure, but other protocols regarding quarantine and infectious disease do exist. It is recommended that all producers are familiar with local or industry-accepted procedures.

Background

Upon the suspicion of an infectious disease in a poultry flock, the following set of guidelines should be followed by the producer. The intention of this protocol is to limit the spread of disease between barns and, most importantly, the spread of disease off-farm.

Situation – There has been an **unexplained**:

- increase in mortality;
- change in production parameters, such as feed or water consumption, egg production, or shell quality, etc.; or
- onset of clinical signs of disease.

Action plan

1) Obtain an answer

a. Start your own on-farm investigation. Gather together all relevant documents, including health records of all flocks currently on the farm.

b. Call your veterinarian with a complete description of the problem, including time of onset, duration, and whether things are getting worse or resolving over time. Offer your suspicions as to your thoughts on what the problem might be.

c. Review and provide copies of production and mortality records.

d. Provide representative birds and/or samples for diagnostic investigation:

   i. Call in your veterinarian to do on-farm necropsy and sampling techniques.

   ii. Take birds and/or samples to a local poultry veterinarian and/or to the Vet Lab. (**Note:** there may be special precautions required when moving birds and/or samples off-farm. Consult your veterinarian for proper procedures.)

2) While you wait

a. Follow the advice of your veterinarian, which may involve interim treatment of the flock, based upon the disease suspected.

b. Review and list the on-farm traffic, visitors, and bird movements in the previous 10 days. Refer to visitor log.

c. Immediately adopt enhanced biosecurity protocols. Service unaffected barns first and/or dedicate a specific employee to the affected barn(s). (**Note:** Enhanced biosecurity protocols should be prepared beforehand, in consultation with your veterinarian.)

d. Immediately restrict on- and off-farm access by locking gates and requiring phone-ahead pre-arrangements for deliveries and pickups. Suspend all unnecessary traffic.

e. Inform all family members and employees of the situation. Request confidentiality until diagnosis is confirmed.

f. Follow strict personal biosecurity procedures for leaving the farm (e.g. non-farm clothing, footwear, and vehicle), especially if meeting with other poultry industry members, even socially.

g. Postpone scheduled vaccinations until a diagnosis is confirmed.

h. Postpone movements of any birds on or off-farm.

i. Dispose of dead or culled birds, using an approved method: on-farm is preferable; composting or incineration is recommended. Treat as infectious material.

j. If there is a **strong suspicion** of a highly infectious disease, such as infectious laryngotracheitis (ILT), pox, avian infectious bronchitis (IBV), or avian influenza (AI), based on the visible lesions found at necropsy but before laboratory confirmation, request that the feed or egg truck make your farm the last stop of the day.

3) When diagnosis is confirmed

a. If the diagnosis confirms a "reportable" disease, either the CFIA (federal disease) or your producer association (provincial disease), will have been informed at the same time. Follow up. Prepare records and notes for review.

b. In the case of a "reportable" disease, follow the directions and recommendations of the regulatory agency, but do not hesitate to ask questions.

c. Modify or initiate treatment of flock as directed by your poultry veterinarian.

d. Follow enhanced on-farm biosecurity procedures for at least 10 to 14 days following the end of treatment or the resolution of clinical signs.

e. If they have not already been informed, update your service industry representatives and producer groups of the diagnosis and the measures undertaken for containment.

f. If practical, inform neighbouring poultry operations.

g. If appropriate, make provisions for birds moving directly to slaughter, in which case the processor should be informed.

h. Recommended: Post enhanced biosecurity signs at gates, indicating that an infectious disease has been diagnosed and that access is restricted.

4) Back to normal

a. Your veterinarian should stay involved until the return to normal.
b. Enhance the regular on-farm cleaning and disinfection procedures for the affected barns. Extend clean "downtime" as long as possible.
c. Continue to monitor for disease reoccurrence in the same or subsequent flocks, watch for clinical signs, and submit follow-up samples.
d. Record the event in the production records with as much detail as possible.
e. Return to regular biosecurity measures.

Important note:

Pathogenic Newcastle disease (NDV), avian influenza (AI) and Salmonella pullorum and gallinarum are federally reportable diseases. The CFIA has developed disease response plans and strategies for these diseases upon their identification in domestic flocks.

The national immediately notifiable diseases are infectious laryngotracheitis (ILT), avian cholera (pasteurellosis), chlamydiosis (psittacosis, ornithosis), duck hepatitis, avian encephalomyelitis, egg drop syndrome (avian adenovirus), goose parvovirus infection (Derzsy's disease), and turkey rhinotracheitis (avian pneumovirus, swollen head syndrome). The CFIA must be notified if these diseases occur; however,

limited action is taken, and only with respect to certification of meat product for export to certain countries.

Specific provinces have a list of provincially notifiable diseases that are of significant economic concern, and there may be specific action response plans to the occurrence at the industry level or mandated by the provincial government. The most common ones are infectious laryngotracheitis (ILT) and mycoplasma in breeder birds and turkeys.

All other diseases are "unregulated" and are a private issue between you and your veterinarian. Your confidentiality will be respected, but your cooperation in informing your industry service representatives of a potential infectious disease problem is encouraged and appreciated.

Online Reference:

www.inspection.gc.ca/animals/terrestrial-animals/biosecurity/standards-and-principles/general-producer-guide/eng/1398640321596/1398640379048?chap=10

Appendix H - Sample Emergency Contact Template

EMERGENCY CONTACT LIST

USE 911 FOR ANY EMERGENCIES

Your farm address: _____

FARM EMERGENCY CONTACTS:

Contact 1:

Office phone: _____
Home phone: _____
Cell phone: _____

Contact 2:

Office phone: _____
Home phone: _____
Cell phone: _____

Local police contact (for non-911 emergency): _____

Provincial Ministry of Agriculture: _____

Canadian Food Inspection Agency: _____

Internet service provider: _____

Insurance company: _____

Hospital: _____

Hospital address: _____

INDUSTRY CONTACTS

National and provincial commodity associations:

_____	_____	_____
Organisation Name	Contact Name	Phone Number
_____	_____	_____
Organisation Name	Contact Name	Phone Number

Appendix H – Sample Emergency Contact Template (continued)

Other contacts	**Name**	**Number**
Veterinarian	_____	_____
Barn washer/cleaning crew	_____	_____
Processor	_____	_____
Transporter	_____	_____
Manure haulage	_____	_____
Feed company	_____	_____
Catching crew	_____	_____
Hatchery	_____	_____
Bedding supplier	_____	_____
Renderer	_____	_____
Pest control	_____	_____
Fuel company	_____	_____
Electric	_____	_____
Gas	_____	_____
Water	_____	_____
Other	_____	_____

Appendix I - Resources for Further Information

Flock Health Management

- Canadian Food Inspection Agency (2009) National Avian On-Farm Biosecurity Standard. www.inspection.gc.ca/animals/terrestrial-animals/biosecurity/standards-and-principles/avian-on-farm/eng/1375193894256/1375193980266#sec2
- Canadian Food Inspection Agency (2014) General Producer Guide – National Avian On-Farm Biosecurity Standard www.inspection.gc.ca/animals/terrestrial-animals/biosecurity/standards-and-principles/general-producer-guide/eng/1398640321596/1398640379048
- Canadian Food Inspection Agency (2012) Biosecurity for backyard flock and small bird owners www.inspection.gc.ca/animals/terrestrial-animals/diseases/bird-health-basics/eng/1323643634523/1323644740109
- Government of Canada. Reportable Diseases Regulations. http://laws-lois.justice.gc.ca/eng/regulations/sor-91-2/page-1.html

Preparing and Loading for Transport

- AECOQ 2016. Animal Welfare Training- Waterfowl Transport.

Euthanasia

- AECOQ 2016. Animal Welfare Training- Waterfowl Transport.

Mass Depopulation

- Canadian Veterinary Medical Association (January 21, 2016) *Humane Mass Depopulation of Animals – Position Statement*. www.canadianveterinarians.net/documents/humane-mass-depopulation-of-animals-position-statement

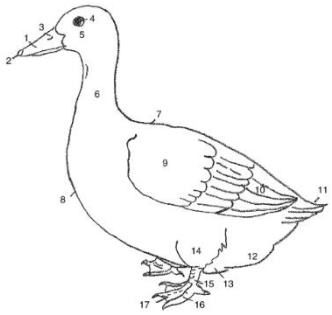
Appendix J - Physiology and Welfare

Excerpt from Animal Welfare Training – Waterfowl Transport from the AECOQ (2016) (72)

A. Brief description and behaviour

Muscovy Ducks

Male ducks are raised during approximately twelve weeks and reach a live weight between 4,2 kg and 4,9 kg, depending on the strain. They are usually sold in cuts of fillets, thighs, drumettes, etc.
Female ducks are raised during approximately ten weeks, reach a weight of 2,4kg to 2,7 kg depending on the strain. The bigger ones are sold in cuts or as whole duck ready to roast.



1. Bec, 2. Diamant, 3. Narine, 4. Œil, 5. Oreille, 6. Cou, 7. Dos, 8. Poitrine, 9. Aile, 10. Rémiges, 11. Queue, 12. Abdomen, 13. Panouille, 14. Cuisse, 15. Pilon, 16. Orteil, 17. Palme.

(Pingel et al, 2012)

Normal behaviours: *(Sauveur, 1990)*

- The adult Muscovy is **calm and silent**.
- Unable to fly because of his heavy weight (unlike the female who is lighter)
- It waddles while head bobbing in a funny way.
- Drakes **can sometimes be aggressive** to defend their food, territories or females; their pecking is painful but harmless.
- The **female will attack other animals or humans to defend her eggs or ducklings**.
- **Then, it gives wings shots, pinches or scratches with its claws and spur.**
- Muscovy ducks **like to be surrounded by congeners** with which they can communicate in different ways: the male can tell another that he is not welcome by emitting a sort of muffled hiss, it can also scare off the intruder by running a kind of dance or he advances in lowering and lifting the head while emitting muffled cries.
- The opposite duck may respond by adopting the same behaviour.
- Muscovy ducks are **mainly active** in the morning and evening, when the **heat is less intense**.
- It **carefully maintains its feathers with many grooming sessions** during the day. Loves being close to water.

Mulard Ducks

The Mulard is a hybrid from a male Muscovy duck and a female common duck (usually Pekin type) it is intended for the production of foie gras and duck breast. Male Mulards are preferred over females for foie gras production.

Normal behaviours: *(Brun et al, 2005)*

- Work on the behaviour of Mulard ducks has focused on their stress reactions and emotional reactions toward force-feeding, in response to the animal welfare questioning associated with this practice.

- Results show that force-feeding itself is not a major source of stress for Mulard ducks when placed in individual cages since there is no increase in cortisol (indicator of acute stress) resulting from force-feeding. (Guémené et al, 2004a).
- However, these researches demonstrate that Mulard ducks show a **strong behavioural sensitivity**, **particularly when the force-feeding involved capture and restrain**, **potentially sources of acute and/or chronic stress**.
- The behaviour problem of the Mulard was raised parallel with laundering of strains of common ducks as mother of Mulard, with notably the appearance of behaviour inducing difficulties during the rearing phase. Nevertheless, this hypothesis has not been verified.
- White feathered Mulards do not exhibit behavioural responses significantly different from colored feathered Mulards. (Guémené et al 2003, Guémené et al 2004b).
- Responses observed in tonic immobility, or open-field tests suggest that the Mulard duck is a **fearful or emotional animal**, **and likely very sociable** (Guémené et al 2004b).
- Work has been done on the reactions of stress and fear to humans, compared to the parental species (Faure et al. 2003). The Mulard shows, according to the measured character, reactions intermediate to those of the two parental species (corticosterone levels), or identical to one of the two parents (behavioural responses), or even extreme reactions, including for the avoidance to humans.
- In addition, there is also a genetic variability in the behavioural responses of common duck and the cortisol response measured in the Mulard, with heritabilities of the order of 0.3 for travel in the open-field test and corticosterone level after a test of tonic immobility or restraint in net

Peking ducks

The Peking duck is a domestic duck stemming from the Mallard duck. Peking females are used in crossing with the Muscovy male for obtaining the Mulard duck.

B. Animal well-being considerations (Pingel et al, 2012)

An adequate production system should take into account this aspect. The criteria for judging the state of well-being of ducks are:

- Body condition, normal weight and good posture;
- movements and other behavioural expressions (walking, bathing, cleaning);
- breathing, no panting;
- plumage aspect, eyes (lively and bright), skin (clean and healthy), beak, legs and paws (yellow-orange in color, well formed and free from lesions and necrosis):
- feces aspect (light brown and foamy aspect reveal nutritional problems
- feed and water consumption levels;
- growth rate, intensity and length of the laying period;
- mortality rate or animal culling rate;
- vocalization adequate according to age and sex.

The requirements for a proper conduct of farming are as follows:

- access to a balanced food and water at any time. These components must be free of contaminants and residues;
- feeders and waterers adapted to the behaviour of the animals;
- appropriate and separated spaces for watering and feeding, laying, equipped with specific equipment;
- a building adapted in its design and the choice of the litter;
- farming practices adapted to the age of ducks;
- areas with different temperatures;
- suitable lighting and a pilot light for the night;
- the reduction of harmful emissions (dust, ammonia, carbon dioxide, noise and odours);
- remove the discomfort by avoiding wet litter and full slatted floors;
- the space allocated to the birds must be sufficient to enable them to move freely and meet their behavioural needs (including social behaviour);
- a suitable stocking density and proper herd size;
- adequate handling practices during capture, transport and slaughter;
- cleaning and disinfection of the barn and its equipment between two lots and the provision of care for the duration of the production period;
- keep separately birds from different age or provenance;
- for free-range production, delineate areas and do rotations to prevent contamination with pathogenic organisms and the total destruction of the grass;
- in the case of access to swimming, check the level of water pollution and make corrections if necessary.

C. Skeletal system

Primary role:

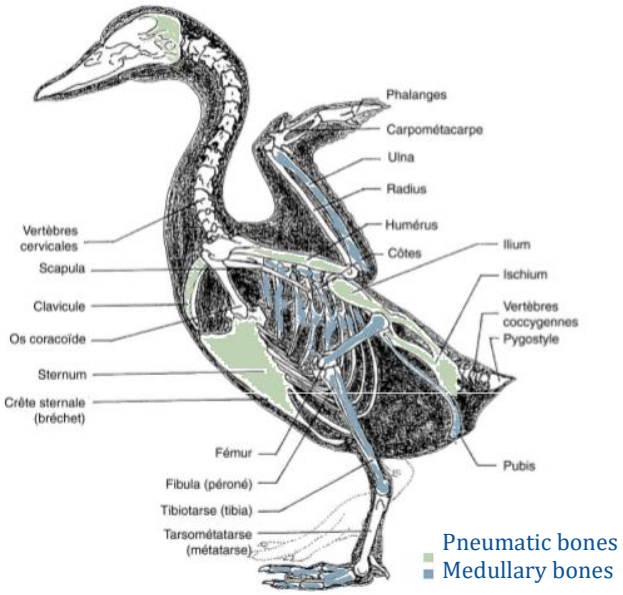
- Structural support

Supplementary functions:

- breathing
- calcium transport.
- muscle support

There are two types of bones that make up the skeletal system: The Medullary bones and

Pneumatic bones. Pneumatic bones are important for breathing. They are hollow bones linked to the respiratory system.



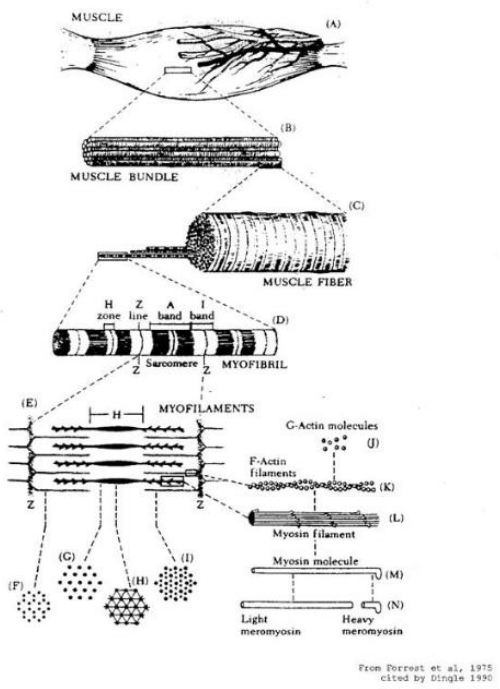
Adapted from Pingel et al 2012

Characteristics of the species (King and McMilland, 1984)	
Ducks have short legs	**Impacts:** • Poor walkers = wadding gait • Happier in water or in the air
	Considerations: Walking over medium and long distances therefore requests an additional effort the animal. Thereby increasing the risk of muscle fatigue, injury and shortness of breath.
Legs are located far behind on body	**Impacts:** • Away from the center of gravity. • Difficulty standing for long periods • Advance awkwardly wriggling on their abdomen
	Considerations: The front of the body, chest and abdomen will be more likely to be in contact with the ground. This increases the risk of injury (internal and external) and also reduced respiratory capacity of the waterfowl.
Hind legs are attached through the skin to the body near the tarso-metatarsal articulation, unlike other birds	**Impacts:** • The legs are not as mobile as the ones of chickens for example.
	Considerations: Lifting a waterfowl off the ground by grabbing both legs with one hand may cause pain and injury.

D. Muscles

The muscular system provides the mechanical activity for the animal in the form of the mobility of the various parts of the skeleton or its appendices, the movement of materials along tubular such as the gastrointestinal tract, airway organs and blood vessels and the pumping of the blood through the circulatory system through the heart.

Muscles are composed of special muscle cells in the form of fibers that have the capacity to contract or shorten. When they relax, the muscle lengthens.



Source : www.poultryhub.org

Muscle types:

There are three types of muscles in the body of the bird:

1.Involuntary muscle found in the walls of the digestive tract, blood vessels, air passages and other tubular structures.

2. The cardiac muscle of the heart. It is also a type of involuntary muscle, but it is striated and is structured differently from other muscles.

3. Striated or striped muscles are voluntary muscles in the body that move different parts of the skeleton or some appendices. It is filiform muscle fibers grouped in very tiny bundles surrounded by sheaths of fibrous tissue.

Structure of a skeletal muscle:

Typical voluntary muscle is composed of long muscle bundles. Each fiber is made of long strands called myofibrils which in turn consist of segments called myofilaments. The myofilaments, consist of filaments of myosin and actin filaments, arranged so that the myosin filament is a nucleus surrounded by actin filaments which are not continuous, but form rather a structure in the shape of each end cap. Skeletal muscles are attached to bones by highly resistant fibrous bands called tendons**.**

Muscular contraction

Muscle contraction occurs in response to a stimulus from the nervous system, usually either on a voluntary or involuntary basis. The muscular system provides power to the animal, and it is there that a large part of the energy contained in food is used for a normal voluntary and involuntary activity.

Types of skeletal muscle fibers

To consider when handling:

Respect the anatomical limits of joints when handling

Two types of skeletal muscle fibers, the white and red fibers, found in poultry and all muscles contain some portion of each of these fibers. However, the proportion varies, and some muscles are predominantly white and other mainly red (or dark). White fibers lack myoglobin but store more glycogen and have a rapid contraction of short duration. They have little endurance. The breast of poultry, the flight muscles, are predominantly white fibers and thus have a very low ability of flight. They fly very short distances with a very fast movement. Red fibers as they have of myoglobin and other cellular structures for continuous production of energy for contraction. These fibers have a slow contraction of long duration. The flight muscles for the birds that really fly, consist mainly of red fibers, which is the case for waterfowls.

http://written-in-stone-seen-through-my-lens.blogspot.ca

To consider during handling and transport:

In the event of poor feathering, adjust the capture to minimize scratching. As much as possible, keep birds dry during loading and transport.

- Minimize flapping
  - Limited vascularizatio
  - Deep breast muscles (deep pectoral myopathy- green muscle)
- Dislocation risk

E. Joints (legs and wings)

a) Ligaments and tendons (attachement points) :

- Be gentle when handling
- These ligaments and tendons are designed to withstand a force or load depending on weight and activity of the bird itself and not a force, or an obligation imposed by an external handler.

b) Anatomical limitations : (naturel angles)

- Limbs do not have universal joints, joints allow only a few specific movements in limited axes, angles and amplitudes
- Gentleness is required during handling.

F. Integumentary system (skin,hair,feather,exocrine glands)

1. Feathers

(1) Thermal protection: The structure of the feathers can trap air, and plays a role of insulation, for both the heat and the cold.

(a) Insulating capacity (dry vs wet)

A wet feather, either by the environment (rain, snow) or by the condensation of moisture in the air (generated by barn or transport conditions), no longer fulfils its insulating functions and allows heat conduction

(2) Physical protection

Function: to protect the bird from external damages

Therefore, the absence of feathers will pose a problem for thermal and physical comfort of ducks in the transport, making them more vulnerable to cold and bruising. Their transportation remains possible, but adaptation measures must be put in place to ensure their comfort.

G. Cardiorespiratory and vascular system

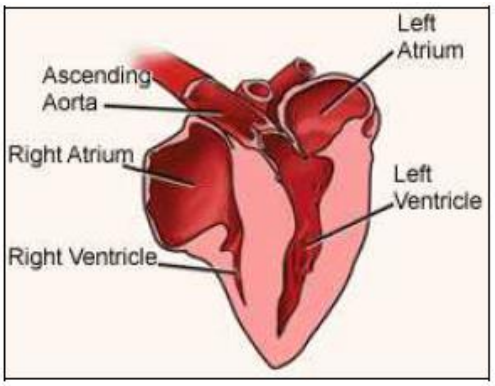
Circulatory system

The avian circulatory system consists of a heart and vessels that carry nutrients, oxygen and carbon dioxide, cell wastes, hormones and heat. The vascular system of birds differs from that of mammals by the fact that it has an additional renal portal system. Venous blood from the legs flows directly to the kidneys and following the posterior vena.

To consider during transport:

When a bird is wet, the discomfort resulting then forces it to spend much more energy in the cool down or warm up process. Transporting wet birds puts them greatly at risk, especially in cold weather.

Heart of a bird



Like mammals, birds have a heart with 4 cavities with full separation between oxygenated and deoxygenated blood. The right ventricle pumps blood to the lungs, while the left ventricle pumps blood to the rest of the body. Because the left ventricle must generate greater pressure to pump blood throughout the body (compared to the right ventricle, which pumps blood to the lungs), left ventricular walls are much thicker and more muscular.

Birds tend to have hearts bigger than those of mammals (compared to the size of their body and their mass). The relatively large heart of birds may be necessary to meet high metabolic needs during the flight. Among birds, the smallest birds have a heart relatively more important (again relative to their body and their mass) than larger birds. So, hummingbirds, for example, have the biggest heart of all birds, probably because stationary flight.

The poultry hearts also tend to pump more blood per unit of time than the hearts of mammals. In other words, the cardiac output (the amount of blood pumped per minute) for birds is generally higher than in mammals of the same body mass. Cardiac output is influenced by heart rate (beats per minute) and stroke volume (blood pumped with each heartbeat). “Active” birds increase cardiac output mainly by the increase in heart rate.

Red and white blood cells are formed in the spleen. The red blood cells of a bird are unique since they are nucleated (it has a core) while those of a mammal don’t. Important diseases of the cardiovascular system detected in poultry meat inspection are pericardial, and ascites. Pericarditis is an inflammation of the pericardium, which surrounds and lubricates the heart. Ascites is an increase in the fluid in one or more of the abdominal spaces.

Ducks subject to high ambient temperatures present many behavioural changes which allow then to restore their thermal equilibrium with their environment. They tend to rest more or will position themselves near walls or waterers. They spread their wings away from the body to promote cooling by reducing the insulation of the body. Within the bird, the blood is diverted from some internal organs of the body such as the liver, kidneys and intestines to the blood vessels dilated peripheral tissues (i.e. skin) in order to facilitate heat loss.
As ambient air temperatures increase above 26 °C, ducks react by trying to lose more heat through evaporative cooling, which is accomplished by panting. However, this process generates more heat through muscular activity involved in panting. Normally, blood pH is controlled by the lung and kidney as well as the different buffer systems that prevent rapid changes in the pH.

While respiratory rate increases in heat stressed ducks, there is also a corresponding decrease in blood carbon dioxide levels. Thus, blood acid-base balance is disturbed, and respiratory alkalosis occurs (i.e., high blood pH). This causes a decrease in blood calcium and bicarbonate which are necessary for strong bones.

Thermoneutral zone

The thermoneutral zone determines a temperature zone in which the animal spends no energy for is cool down or warm up.

The metabolic heat production is affected by genotype, age, food intake and physical activity. To maintain thermal equilibrium and body temperature, the heat lost must be equal to the heat produced. Under cool temperature conditions, birds primarily use convection, conduction and thermal radiation to maintain thermal equilibrium. As the temperature increases, the bird loses its ability to use these mechanisms of temperature regulation.

When the room temperature increases beyond the boundary of the thermoneutral zone, birds may maintain their thermal equilibrium using the transfer of heat by evaporation. This exchange will be done by breathing.

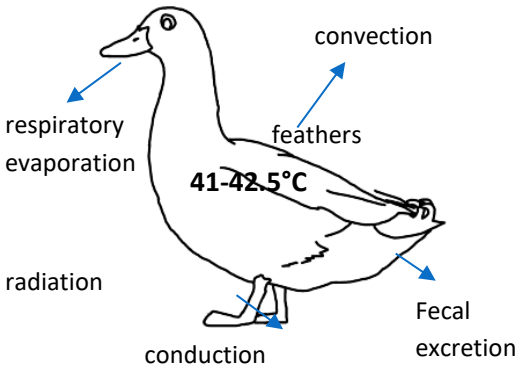
Note: high relative humidity reduces the possibility of evaporation and increases so the sensation of heat stress: at 34 °C and 40% humidity, birds lose 80% of the heat by evaporation compared to the same temperature but with 90% humidity, evaporative losses now represent no more than 39%. For evaporative loss to take place, water consumption must be optimal.

- *That is why, in the context of transport, we will allow water access until the last minute and will try to control the ambient relative humidity in order to optimize the respiratory evaporative heat loss mechanism.*

For Peking ducks, Cherry & Morris, report that the thermoneutral zone lies between -8 °C to26 °C, for a 3.6 kg duck with a body temperature of 41 °C.

Caloric transfers will necessarily settle with more or less importance between the bodies of animals and the environment by:

1. ***convection***, in direction of the air, through the down, then feathers when the animals are older;
2. ***by conduction***, by contact with certain parts of the body, legs and chest, with the litter;
3. ***by radiation***, through the air, in the direction of the walls or colder litter;
4. ***by respiratory evaporation*** of water in the lungs, each evaporated gram of moisture requires 0,6 kcal;
5. ***by fecal excretion (flushing)***.



H. Respiratory system

The respiratory system is involved in oxygen uptake, the release of carbon dioxide, the release of heat (temperature control), the detoxification of certain chemical substances, the rapid adjustment of acid-base balance and the vocalization

While the function of the avian respiratory system is comparable to that of mammals, the two are quite different anatomically. Birds do not breathe as do mammals. Like mammals, birds have two symmetrical lungs that are connected to a trachea. But the similarity ends here. The lungs of mammals contain many bronchi (tubes), which lead to small bags called alveoli. Because the alveoli have a single opening, air can enter and exit, but can not flow through them outside of a lung. In comparison, the avian lung has parabronchi which are continuous tubes allowing air to pass through the lungs in one direction. They are laced with blood capillaries, and it is at this point that gas exchange occurs.

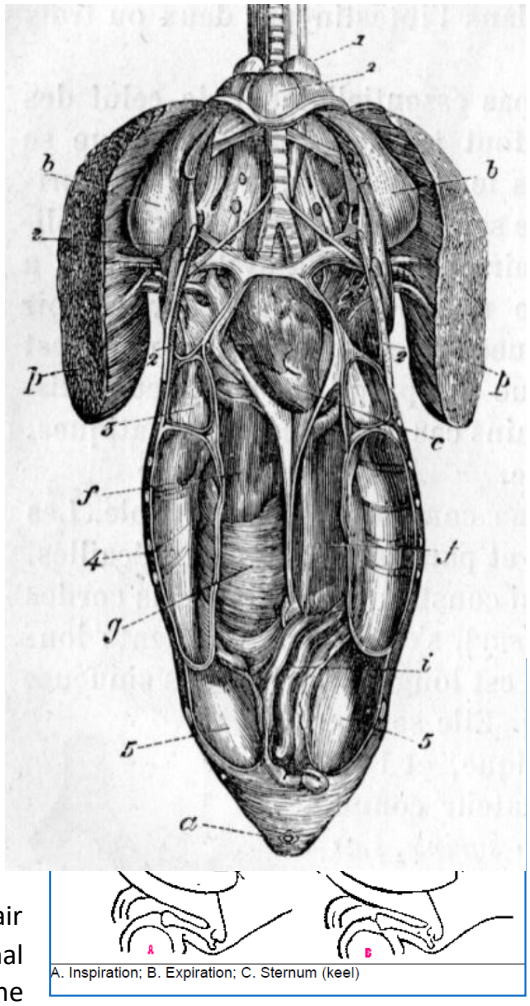
To consider during handling and transport:

- Force-feeding = production of extra heat
- In cage: movement restriction
- Year-round production: environmental constraints
    - Ventilation, cooling, acclimatization
- Transport density: hot weather considerations

The trachea splits into two smaller tubes called bronchi. When certain respiratory diseases occur, tracheal plugs often form and they physically block the airway at the junction of the bronchi. As a result, the ducks choke. Excessive dust in the air is expected to also cause the formation of granulomata tracheal plugs and affect the health of ducks. The avian respiratory system begins with the glottis which closes when the food enters the throat to prevent it from getting in the lungs. The trachea is composed of cartilaginous rings that prevent its collapse which might be caused by the negative pressure generated by breathing in

air. In the syrinx, the vocalization of the bird is produced by the pressure of the air on a sound valve and modulated by muscle tension.

The lungs are relatively small and do not expand. Instead, they are firmly attached to the sides. Birds have an incomplete diaphragm and arrangements of thoracic musculature and the sternum do not lend themselves to the expansion in the same way as the mammalian breast. As a result, they cannot inflate and deflate their lungs in the same way as do mammals. Instead, birds spend the air from the lungs through air sacs, a unique to poultry anatomical feature. The air sacs are structures resembling balloons at the "ends" of the respiratory tract. With ducks, there are nine of these bags. One unpaired cervical sac; two interclavicular sacs, two abdominal sacs, two anterior thoracic sacs, and two posterior thoracic sacs.



A. Inspiration; B. Expiration; C. Sternum (keel)

What you should remember of the avian respiratory system is that it is the stretching and compression of air sacs that are entering or exiting the air, not the lungs. At any time, air can flow through the lungs while being stagnant in the air sacs.
The lungs are rigid and fixed compared to the expansive lungs of mammals. Air sacs act as bellows to aspire and breathe out air, but also to contain a portion of the total air volume. The air sacs fill a large part of the chest and abdominal cavity of the bird and connect also to the air cavities in the bones.

Air quality

With each breathing, ducks' respiratory tracts are exposed to the inner barn environment. Poor environmental conditions do not normally cause diseases directly, but they will reduce the natural defences of the ducks, which will render them more susceptible to pathogenic agents and existing viruses.

The air of livestock buildings may contain aerosol particles or "dust" from the litter, from the feed, from dried manure and skin and from ducks' feathers. These particles can have a variety of adverse effects on

To consider during handling and transport:

- Birds do not have a diaphragm and rely on the movement of the sternum (keel) and of the thoracic cage to breathe.
- By compressing a bird's thoracic cage, we restrain its movement and choke the bird. The result is the same if we carry a bird on its back or vertically with its head down.
- Any damage to the bones of the thoracic cage will obviously cause pain and impair breathing.

poultry. They act as an irritant to the respiratory tract and cough is a physiological reaction, designed to remove those particles.

Excessive coughing decreases the resistance of ducks to diseases. The aerosol particles often accumulate inside the duck and can increase condemnation rate of the carcasses at the processing plant.

The respiratory tracts of the duck are normally equipped with defence mechanisms to prevent or limit the infection by airborne disease agents to remove inhaled particles and clean the respiratory tract. The health of the duck is affected by three defensive elements function: Cilia, mucus secretions and cleaning cells that consume bacteria

Cilia are tiny structures resembling hair in the trachea. The cilia are responsible for the elimination of intercepted particles. Meanwhile, mucus is produced in the trachea. The secretion of mucus and the movement of the cilia are well developed in the ducks. The consistency of the mucus produced is important for the effectiveness of ciliary activity. Cilia may not function when mucus is too thick. Cleaning cells in the lung actively digest inhaled particles and bacteria that have entered in the lower respiratory tract. These cells consume the bacteria and kill them, thus preventing their spread.

This is the built-in function of the cilia, mucus and cleaning cells that maintains ducks'respiratory tracts free of pathogenic organisms. The impairment of one of these elements allows a buildup of pathogens in respiratory tract and can cause disease.

In the barn, gas come from the decomposition of manure, emissions from the duck
and poorly maintained or improperly installed equipment such as gas burners. Harmful gases which occur most often in duck barns are ammonia (NH_3) and carbon dioxide (CO_2).

Research showed that ammonia, even at concentrations as low as 10 ppm will cause excessive production of mucus and damage to cilia. Research has also shown that 10 to 40 ppm ammonia levels reduce the excretion (evacuation) of the e. coli in the air sacs, lungs and trachea of the ducks.

I. Nervous system and sense organs (Pingel et al, 2012)

The role of the nervous system is to make the relay between the environment, the organism and the different parts of the body. The sense organs are sensitive stimuli receptors. These individual stimuli are transmitted by the central nervous system (the brain and spinal cord). The brain controls countless functions, digestion, elimination of waste, breathing, heart activity, blood circulation and reproductive function.

Their sense of sight is indeed well-developed: pretty big eyes are housed in cavities on both side of the head, giving them **a wide field of vision.** However, their field of spatial vision ends a few centimetres before the top the beak. To see a subject correctly in space, they are obliged to fix it alternately with the left eye and the right eye. Ducks are diurnal birds and they perceive colors. The eye is protected by a membrane that allows also the eye to see under water.

Their visual features cannot allow them to recognize each other at a distance of 80 m. However, they can recognize a white plate from 15 m. **Ducks therefore rely on both their ears and their eyes. They exploit sounds as behavioural stimulus signals to alert each other** from danger or to communicate between mother duck and its ducklings.
Ducks feel pain and temperature variations and perceive tactile sensations. The sense of pain is poorly developed at the level of the skin which is protected from by the feathers from possible injury. The touch sense is well developed and is coupled to the sense of sight to sort and choose the food. There are many tactile corpuscles at the end of the beak on the mucosa of the tongue and in the mouth cavity. These corpuscles are also found in both soft and ribbed sides of the beak that allow to filter and retain nutrients in the water.

The moisture contained in the food is an additional element of importance that will be perceived by the sense of touch. It is known that ducks prefer a wet food. Smell is underdeveloped in ducks. It is perceived only by a small area of the nasal mucous membrane.

J. Poultry health.

As a first step, we will consider the flock's health status and we will later look in greater details at the fitness to transport of the birds on an individual basis.

To consider during handling and transport:

- Good field of vision so recommended to approaching ducks calmly
- Will perceive noise before seeing you, be calm, avoid surprising them (e.g. knocking at the door)

Understanding and agreeing on what is a healthy and fit for transport flock is a necessary coherence effort for all the stakeholders involved in the transport of poultry (grower, catcher transporter, processor).

Healthy flock (can be transported):

What are the signs:

- Birds are alert, curious, active, eating and drinking.
- Birds look uniform in weight
- Feathers are smooth and clean
- No discharge from eyes and nostrils
- Feces are solid (hold together, do not seem liquid) area on the tail is not dirty with feces
- Dead and sick animals; if any are difficult to spot.

Sick flock (can be transported under conditions):

What are the signs:

- Presence of many dead animals
- When looking closely, head and sinuses seem swollen and puffed
- Birds don't react. Do not walk away when we approached them. They remain seated, their plumage inflated and appear to be asleep.
- Seem short of breath, panting. Coughing or open mouth breathing.
- Neurological problems such as: head hunched on the side, tremor or lack of coordination.
- Unable to stand or walk
- Many birds injured or limping
- Dirty or bloody cloaca
- Hemorrhages to the legs or the skin
- Diarrhea
- Footpad lesions (sigh of litter, equipment or barn management issue

Pododermatites de canard de Barbarie de gravité croissante

Pingel et al, 2012

Diseases

In this document we will not cover all possible duck diseases. We will bring our attention to diseases or conditions that could harm the welfare of ducks in the transport process and which could cause undue suffering, as required by the regulation.

Although the diseases are not necessarily easy to identify, we must however exercise discernment in ensuring that animals in transport do not suffer from serious respiratory, cardiac or locomotor conditions or dysfunctions.

Appendix K - Loading Densities

NOTE:

Because no Code of Practice exists for ducks, **the criterion for assessment of density is mainly visual**.

It is necessary that the animal has its **legs on the ground**, **no piling** on top of one another in the crate or compartments and the ducks must be able to **move their head freely**.

The AECOQ based the densities on European standards and on birds of similar weight in Canada. The following was produced for the Training on Animal Welfare, Transport of Waterfowl (January 2016). (72) These requirements are now being used as references by the AECOQ members and they also serve to clarify expectations and justify decisions related to ducks' loading densities in transport.

TRANSPORT CODE OF PRACTICE (2001)

Broiler Chickens	63 kg/.929 m^2
Chicken Broiler Breeders	66 kg/.929 m^2

Reduced Density during hot weather:

Broiler Chickens	54 kg/.929 m^2
Chicken Broiler Breeders	56 kg/.929 m^2

Internal surface area 0.3996 m²
Maximal capacity (voluntary*): 28 kg /cage
**not defined by CFIA*

Transport code of practice (2001)
Chicken broiler breeders 66 kg/.929 m²

Reduced density in hot weather:
Chicken broiler breeders 56 kg/.929 m²

www.polybel.fr

The density chart for chicken broiler breeders seems to be a good target.
With the aim to have from 10 to 15% safety margins below maximal density.

Polybel		Density				
		Normal		Hot		
Live weight (kg)	*# birds/crate*	*Total kg/crate*	*kg/0.929m²*	*# birds/crate*	*Total kg/crate*	*kg/0.929m²*
3.00	8	24.0	55.8	7	21.0	48.8
3.20	8	25.6	59.5	7	22.4	52.1
3.40	7	23.8	55.3	6	20.4	47.4
3.60	7	25.2	58.6	6	21.6	50.2
3.80	6	22.8	53.0	5	19.0	44.2
4.00	6	24.0	55.8	5	20.0	46.5
4.20	6	25.2	58.6	5	21.0	48.8
4.40	6	26.4	61.4	5	22.0	51.1
4.60	5	23.0	53.5	4	18.4	42.8
4.80	5	24.0	55.8	4	19.2	44.6
5.00	5	25.0	58.1	4	20.0	46.5
5.20	5	26.0	60.4	4	20.8	48.4
5.40	5	27.0	62.8	4	21.6	50.2
5.60	4	22.4	52.1	3	16.8	39.1
5.80	4	23.2	53.9	3	17.4	40.5
6.00	4	24.0	55.8	3	18.0	41.8
6.20	4	24.8	57.7	3	18.6	43.2
6.40	4	25.6	59.5	3	19.2	44.6
6.60	4	26.4	61.4	3	19.8	46.0
6.80	3	20.4	47.4	3	20.4	47.4
7.00	3	21.0	48.8	3	21.0	48.8
7.20	3	21.6	50.2	3	21.6	50.2
7.40	3	22.2	51.6	3	22.2	51.6
	MAX:	**28**	**66.0**		**24**	**56.0**
Safety margin	**Min (10%)**	25.2	59.4		21.6	50.4
	MAX (15%)	22.7	62.7		19.4	45.4

Surface area 0.3932 m²
Maximal capacity (voluntary*): 28 kg /cage
** not defined by CFIA*

Transport code of practice (2001)
Chicken broiler breeders 66 kg/.929 m²

Reduced density in hot weather:
Chicken broiler breeders 56 kg/.929 m²

www.ufs-aviculture.fr

Allibert 2 lids	Density					
	Normal			Hot		
Live weight (kg)	# birds/crate	Total kg/crate	kg/0.929m²	# birds/crate	Total kg/crate	kg/0.929m²
3.00	8	24.0	56.7	7	21.0	49.6
3.20	8	25.6	60.5	7	22.4	52.9
3.40	7	23.8	56.2	6	20.4	48.2
3.60	7	25.2	59.5	6	21.6	51.0
3.80	6	22.8	53.9	5	19.0	44.9
4.00	6	24.0	56.7	5	20.0	47.3
4.20	6	25.2	59.5	5	21.0	49.6
4.40	6	26.4	62.4	5	22.0	52.0
4.60	5	23.0	54.3	4	18.4	43.5
4.80	5	24.0	56.7	4	19.2	45.4
5.00	5	25.0	59.1	4	20.0	47.3
5.20	5	26.0	61.4	4	20.8	49.1
5.40	4	21.6	51.0	3	16.2	38.3
5.60	4	22.4	52.9	3	16.8	39.7
5.80	4	23.2	54.8	3	17.4	41.1
6.00	4	24.0	56.7	3	18.0	42.5
6.20	4	24.8	58.6	3	18.6	43.9
6.40	4	25.6	60.5	3	19.2	45.4
6.60	4	26.4	62.4	3	19.8	46.8
6.80	3	20.4	48.2	3	20.4	48.2
7.00	3	21.0	49.6	3	21.0	49.6
7.20	3	21.6	51.0	3	21.6	51.0
7.40	3	22.2	52.4	3	22.2	52.4
	MAX:	28	66.0		24	56.0
Safety margin	Min (10%)	25.2	59.4		21.6	50.4
	MAX (15%)	22.7	62.7		19.4	45.4

The density chart for chicken broiler breeders seems to be a good target.

Poly Koop cage

Surface area: 0,45 m²
Maximal capacity (according to CFIA): 28.4kg* /cage

www.indiv.com

Transport code of practice (2001)
Chicken broiler breeders 66 kg/.929 m²

Reduced density in hot weather:
Chicken broiler breeders 56 kg/.929 m²

Poly Koop	Density					
	Normal			Hot		
Live weight (kg)	# birds/crate	Total kg/crate	kg/0.929m²	# birds/crate	Total kg/crate	kg/0.929m²
3.00	8	24.0	49.5	7	21.0	43.4
3.20	7	22.4	46.2	6	19.2	39.6
3.40	7	23.8	49.1	6	20.4	42.1
3.60	7	25.2	52.0	6	21.6	44.6
3.80	6	22.8	47.1	5	19.0	39.2
4.00	6	24.0	49.5	5	20.0	41.3
4.20	5	21.0	43.4	4	16.8	34.7
4.40	5	22.0	45.4	4	17.6	36.3
4.60	5	23.0	47.5	4	18.4	38.0
4.80	5	24.0	49.5	4	19.2	39.6
5.00	4	20.0	41.3	3	15.0	31.0
5.20	4	20.8	42.9	3	15.6	32.2
5.40	4	21.6	44.6	3	16.2	33.4
5.60	4	22.4	46.2	3	16.8	34.7
5.80	4	23.2	47.9	3	17.4	35.9
6.00	4	24.0	49.5	3	18.0	37.2
6.20	4	24.8	51.2	3	18.6	38.4
6.40	4	25.6	52.8	3	19.2	39.6
6.60	3	19.8	40.9	3	19.8	40.9
6.80	3	20.4	42.1	3	20.4	42.1
7.00	3	21.0	43.4	3	21.0	43.4
7.20	3	21.6	44.6	3	21.6	44.6
7.40	3	22.2	45.8	3	22.2	45.8
	MAX:	28.4	66.0		24.14	56.0
Safety margin	Min (15%)	24.1	56.1		20.5	47.6
	MAX (20%)	19.3	44.9		16.4	38.1

The density chart for chicken broiler breeders seems to be a good target.
This type of cage seems to offer less surface opening than the previous two. For this reason, it would be interesting to give a greater safety margin.

*** Note:**
For poultry, CFIA has determined the maximal ways for each type of cage is used by the industry. For the Poly Koop cage, calculations have been made with loading density of broiler chicken which is 63 kg/m² X cage surface area (0,45 m²) = 28,4 kg.
It will be important to validate that are still pertinent with a loading density of 66kg/m².
Considering the safety margins suggested here, our assumptions are most probably right.

Loading Peking ducks on a trailer

Maximum capacity per section: xxx kg /section of A x B x C

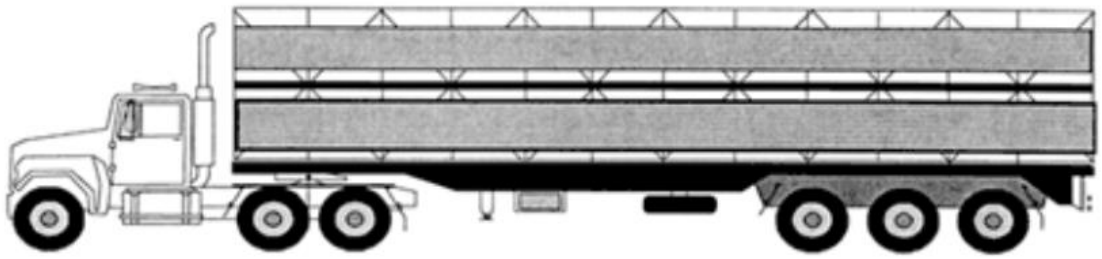
Transport code of practice (2001)
Broiler chicken 63 kg/.929 m^2

Reduced density in hot weather:
Broiler chicken 54 kg/.929 m^2

For this type of duck, females weight varies from 2.8 to 3.2kg whereas males weight varies from 3.3 à 3.5 kg. The density chart for broiler chicken seems to be a good target.

It will be important to build a chart for each trailer, which will clearly indicate the number of ducks to be placed per compartment. Densities should take into account various factors like target weights, gender, hot temperatures, etc.

For trailers with metal sidings, make sure not to overcrowd the ducks which would force them to be in contact with the cold-conductive metal. Sufficient adequate bedding should also be considered in order to improve duck comfort, especially if ducks are directly in contact with metal surfaces. If the trailer offers plastic or rubber matting, bedding necessity is perhaps not as essential.



OTHER CONSIDERATIONS:

- Target: reach the expected total weight per compartment.
- Different charts? Male/ Female
- Thaw season
- And, Extreme heat

Appendix L - Humidex Guidelines for Loading Poultry

Humidex = "Feels Like" Temperature

Humidity	Temperature 20 C	25 C	30 C	35 C
50%	22	28	36	45
60%	24	30	38	46
70%	25	32	41	49
75%	26	33	42	50
80%	26	33	43	52
85%	27	34	44	53

Source:
Environment Canada

Temperatures are listed across the top and humidity down the side. The temperature that correlates with each level of humidity combine to make a humidex value (or "feels like" temperature).

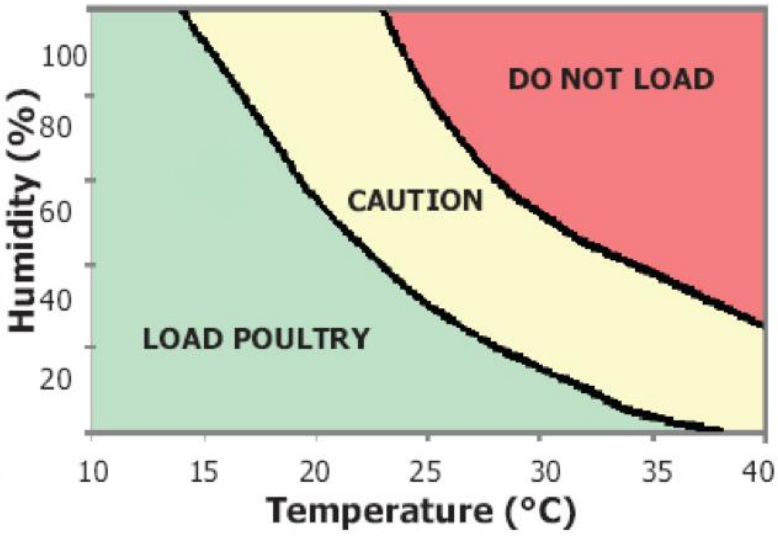
For more information:

Classen H.L., Knezacek T., Audren G.P., Stephens s., Crowe, T., Barber E.M., Olkowski A.A., Mitchell, M.A. Kettlewil P.J. (2002): Final Report : Studies on Broiler Chicken Transportation in Saskatchewan; Project SDAF# 19990246-24BX

Mitchell, MA, and PJ Kettlewell, 1998. Physiological stress and welfare of broiler chickens in transit: solutions not problems! Poultry Science, 77: pp. 1803-1814.

Mitchel, MA, Kettlewell, PJ, Carlisle, AJ and Matheu, C. 1996. The use of apparent equivalent temperature (AET) to define the optimum thermal environment for broilers in transit. Poultry Science 75, supplement : p. 18

Humidex Guidelines for Loading Poultry



Appendix M - Preparing and Loading for Transport

- Ontario Farm Animal Council, Poultry Industry Council, Ontario Ministry of Agriculture Food and Rural Affairs (2012) *Should this Bird be Loaded? A Guide for Preparing, Loading, and Transporting Poultry.* www.poultryindustrycouncil.ca/wp-content/uploads/2012/03/DT-Handbook-final.compressed.pdf
- Ontario Ministry of Agriculture and Food & Ontario Ministry of Rural Affairs; Association of Ontario Chicken Processors; Chicken Farmers of Canada (February 2013) *Humane Broiler Catching for Catching Crews.* www.poultryindustrycouncil.ca/resources/humane-handling-materials/
- Ontario Ministry of Agriculture and Food & Ontario Ministry of Rural Affairs (2013) *Humane Turkey Catching for Catching Crews and LoadingCrews.* www.poultryindustrycouncil.ca/resources/humane-handling-materials/
- Farm & Food Care Ontario; Poultry Service Association (2015) *Ontario Poultry Handling and Transportation Manual*. www.poultryserviceassociation.com/resources.html
- Canadian Agri-Food Research Council (2001) *Recommended code of practice for the care and handling of farm animals – Transportation.* www.nfacc.ca/codes-de-pratiques/transport
- AECOQ 2016. Animal Welfare Training – Waterfowl transport.

Appendix N - Example Euthanasia Decision Guidance

Answering the following questions can assist in making appropriate euthanasia decisions for poultry (adapted from (73) (74):

- Does the bird appear to be experiencing pain or distress (see below)?
- What is the degree of that pain and distress, and can it be treated?
- What is the cause of the pain or distress? Can the cause be addressed?
- Does the bird show interest in feed and water?
- Can the bird access feed and water?
- Is the bird responding positively to treatment, or is its condition getting worse?
- Is recovery likely within an acceptable time frame?
- Is the bird likely to transmit disease to other birds?

Individual operations may establish additional criteria for euthanasia.

The following list provides examples of potential signs of pain or distress in individual birds that warrant further evaluation:

- weak, not alert
- hunched posture with head drawn in, often with closed eyes
- ruffled or dirty feathers unrelated to litter conditions
- unable to rise/walk due to injury or physical abnormality
- reluctance to eat or drink
- severely injured
- swollen head
- emaciation.

Appendix O - Participants

Guide development committee members

Representative	Organisation	Sector
Stéphane Beaudoin, agr	Gestbeau Inc. / Agent de développement AECOQ	Animal Welfare
Ghislain Hébert, DMV	Service vétérinaire ambulatoire Dr.Ghislain Hébert m.v.	Health, Veterinarian
Anne Bérubé	Consultant	Zoology, documentation
Dominique Bolduc	Les Canards du Lac Brome	Production, Slaughter, Processing
Cédric Martineau	Rougié	
Emmanuel Nassans	Les Fermes Hudson Valley	

Review committee members

Representative	Organisation
Stéphane Beaudoin, agr	Gestbeau Inc. – Animal Welfare Specialist
Ghislain Hébert, DMV	Service vétérinaire ambulatoire Dr. Ghislain Hébert m.v.
Christine Jean	Conseil de la Transformation Alimentaire du Québec (CTAQ)
Dominique Bolduc	Les Canards du Lac Brome
Cédric Martineau	Rougié
Emmanuel Nassans	Les Fermes Hudson Valley
Robert Charette, DMV	Demeter Services Vétérinaires inc.
Carole Fortin	Conseil canadien du commerce de détail
Sophie Benoit	Agence Canadienne d'Inspection des Aliments
Julie Nolin, DMV	Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec

Editorial committee members

Stéphane Beaudoin, agr
Ghislain Hébert, DMV
Anne Bérubé

Appendix P - Summary of Guide Requirements

The following is a list of the requirements from this Duck Production Guide: refer to the cited guide section for further information about these requirements.

Section 1- Personnel Knowledge and Skills

- Management must develop and communicate, to all personnel involved in husbandry practices, a Policy or a Code of Conduct covering bird welfare.
- All individuals who work with or care for hatching eggs or birds must be competent in the tasks they are assigned.
- Personnel must be monitored and receive additional training as necessary.

Section 2 - Hatcheries

2.2 Hatching Egg Management and Incubation

- Hatching eggs must be transported, handled, stored, and incubated in ways that promote healthy embryos.

2.3 Hatching egg transfer

- Hatching eggs must be handled and transferred in ways that promote healthy ducklings
- Eggs with the possibility of live embryos that are removed at transfer must be euthanized

2.4 Duckling Processing

- Ducklings, as well as boxes with ducklings, must be kept, treated, and handled in ways that prevent injury and minimize stress.
- Ducklings, as well as boxes with ducklings, must not be dropped from heights that may cause injury.
- Live ducklings must be removed from hatch residue as soon as possible.
- Ducklings must be inspected regularly to ensure that they appear, behave, and sound normal.
- Prompt action must be taken to identify and remedy the causes of duckling injuries.
- Injured or malformed ducklings that are suffering and unhatched live embryos not destined for further examination (break-out) must be euthanized as soon as possible.
- Break-out of unhatched eggs must take place within the day of hatch.
- Vaccines and treatments must be stored, mixed, and administered according to the manufacturers' recommendations and/or the recommendation of a veterinarian.
- Ducklings must never be squeezed, except for the purpose of sexing by vent examination.
- All loose ducklings must be retrieved as soon as possible.

2.5 Physical Alterations and Bird Identification

- Physical alterations to beaks and toes must be reviewed and evaluated regularly for welfare improvements.
- All equipment used to perform physical alterations must be regularly inspected, maintained, calibrated, cleaned, and used according to manufacturers' instructions.

2.6 Holding, Loading, and Transporting Ducklings

- Boxes used for transport must be new or clean and disinfected.
- Boxes with ducklings must be moved smoothly and in such a way that the ducklings do not pile or become trapped.
- Boxes containing ducklings must not be thrown or dropped.
- Ducklings that are deemed unfit for transport must be cared for or euthanized.
- Appropriate environmental conditions must be maintained throughout the transport process to ensure that ducklings arrive at their final destination in good condition.
- Ducklings must be able to stand erect during transport.

Section 3 – Housing and Environment

3.1 Housing

- Waterfowl housing and its components must be designed, constructed, and regularly inspected and maintained in a manner that minimizes the potential for injury and allows for inspection of all birds.

3.2 Feed and Water Equipment

- Feed and water equipment must be maintained in good working order, and any defective systems must be attended to without delay.

3.3 Environmental Management

3.3.1 Temperature, Ventilation and Air Quality

- Waterfowl housing must be designed and constructed in a manner that allows for good ventilation and air quality.
- Heating and ventilation systems must be inspected regularly and maintained in working order.
- Bird behaviour must be observed, and necessary corrective action taken as soon as possible if birds are displaying signs of thermal discomfort.
- Action must be taken to manage ammonia levels if they reach a harmful range (e.g. 20 to 25 ppm)

3.3.2 Litter and Slatted Floor Management

- Bedding that is provided must not be harmful or toxic to birds.
- Clean bedding or slatted floor must be provided for the ducklings at placement.
- Enough bedding must be provided for the comfort of the birds.
- The slatted floor must be adapted to ducks and must not cause any discomfort, pain nor injuries to the ducks

- Litter or slatted floor condition must be monitored daily, and action taken immediately to keep it in an acceptable state.

3.4 Lighting

- A day/night rhythm should be established according to the recommendations of the breeders' company.
- Light control systems must be inspected regularly and maintained in working order.

3.5 Stocking Densities

- Space allowance must be sufficient to allow all birds to be able to sit at the same time.
- Health and/or injury data, if available from processors, must be used to help determine if on-farm stocking densities are contributing to recurring health and/or welfare problems (e.g. foot pad and breast lesions, scratches and bruises).
- The number of birds must not exceed that which can be accommodated by the available barn space and equipment (e.g. feeders, waterers, nest boxes).

3.6 Nests (Ducks Breeders)

- A sufficient number of appropriately-sized nests for the strain and number of females must be provided.

3.7 Hatching Egg Room Environment

- Hatching eggs must be stored in ways that promote healthy embryos.

Section 4 – Feed and Water

4.1 Nutrition and hydration

- Birds must be fed a diet appropriate to their age and genetics, and which contains adequate nutrients to meet their requirements for good health and welfare.
- Ducks must have access daily to sufficient quantities of feed in normal conditions (some exceptions apply, refer to section 4.3).
- Feed and water must be acceptable to birds and free from contaminants at a concentration hazardous to bird health.
- Birds must be provided with fresh, potable water in sufficient quantities for normal hydration, health, and production. Interruptions for the purposes of vaccinations or water system maintenance or catching are acceptable under veterinary instructions.
- Water must be tested at least annually, to ensure its suitability for the birds and corrective action must be taken as necessary.
- Water must be monitored on an ongoing basis for any changes (odours, rust, cloudiness) that may suggest a change in quality.

4.2 Controlled Feeding for Duck Breeders

- The body weight and uniformity of feed-restricted birds must be monitored.

4.3 Controlled Feeding for Ducks in Preparation of Force-feeding Phase.

- Birds must be prepared for force-feeding by gradually increasing the quantity of feed available to them days before starting force-feeding.
- The body weight and uniformity of feed-restricted birds must be monitored.
- When controlled feeding is used, any interruption of feed must not exceed 48 hours.

4.4 Controlled Feeding of Ducks in Force-feeding Phase.

- Feed quantities given to each duck must match the duck's intake capacity.
- Animals must be prepared for force-feeding by increasing gradually the quantity of feed given to them one to two weeks before the actual start of force-feeding.
- The increase of food intake must be done gradually during force-feeding phase.
- Force-feeding equipment must be designed and used so it does not cause injury or pain to the animals.
- The shape and type of restraint equipment, the model and characteristics of cages shall prevent injury to the birds.
- Force-feeding phase cannot exceed: 14 days for ducks kept in individual units and 21 days for ducks kept in collective units.
- Follow advances in science and technology related to alternate ways for producing foie gras.
- Have a written procedure outlining the proper way to force-feed, as well as the signs to watch for in a bird requiring special attention.
- All personnel performing the force-feeding must be trained for the procedure and evaluated on their competence on a regular basis.

Section 5- Flock Health Management

5.1 Flock Health Plan

- A working relationship with a veterinarian must be established.

5.2 Biosecurity Protocol

- A biosecurity protocol must be developed and followed.

5.2.1 Cleaning and Sanitation

- Buildings and equipment must be cleaned, and a disinfectant applied following an outbreak of an infectious disease.

5.2.2 Pest control

- A plan to prevent and control pests including rodents, small animals, wild birds, insects, and predators must be developed and followed.

5.3.1 Health Monitoring

- Flock Inspections must be conducted daily.
- Mortalities and culls must be recorded daily.
- Cases involving unexpected illness, death, or increases in mortality rates must be investigated (e.g. consult a veterinarian, submit samples to a lab).
- Dead birds must be removed and disposed of daily.

5.3.2 Managing Sick or Injured Birds

- Sick or injured birds and birds that exhibit obvious signs of pain must be promptly treated or euthanized (refer to section 8: Euthanasia).
- Birds that are severely lame must be treated or euthanized.
- Any suspected cases of reportable diseases must be reported to a CFIA veterinarian immediately.

5.4 Emergency Management and Preparedness

- A contingency plan for reasonably foreseeable problems that may affect bird welfare must be prepared and reviewed with all personnel.
- Emergency contact information must be readily available.
- At least one responsible individual must be available at all times to take necessary steps in the case of an emergency.
- A backup power system or an alternate method must be available to ensure bird well-being during a power outage.
- All alarms and fail-safe devices, including alternate power supply, must be regularly tested.
- A monitoring system or surveillance procedure must be used to alert personnel of failures of critical systems such as heat or electricity.

Section 6 – Husbandry Practices

6.1 Bird Handling

- Birds must be handled at all times in such a manner that minimizes stress or injury. Birds must not be carried solely by the head, top of the neck, wings, tail feathers or the legs.

6.2 Receiving and Brooding Ducklings

- Facilities must be prepared (i.e. heat, clean, feed, water, bedding) in advance of receiving ducklings so that they can be placed promptly after arrival.
- Farm personnel must be present at the time of delivery and placement and must assess the physical condition of the ducklings.
- Steps must be taken to prevent ducklings from becoming chilled or overheated during the unloading process.
- All ducklings, as well as boxes with ducklings, must be kept, treated, and handled in ways that prevent injury and minimize stress.
- Ducklings, as well as boxes with ducklings, must not be dropped from heights that may cause injury.

6.3 Transferring Birds

- Housing facilities must be prepared (e.g. heat, feed, water) to receive birds in advance of their arrival.
- Farm personnel must be present at the time of delivery and placement to assess the physical condition of the birds.

6.4 Reproductive Management: Duck Breeders

- Growing, feeding, and lighting programs must be managed so that females reach maturity concurrent with or prior to males.
- Social interactions between males and females must be monitored to avoid any distress or injury.

6.5 Reproductive Management: Semen Collection and Artificial Insemination

- Male and female ducks must be handled in such a way as to prevent injury and minimize stress throughout all aspects of the semen collection and artificial insemination processes.

6.6 Hatching Egg Management

- Hatching eggs must be handled and stored in ways that promote healthy embryos.

6.7 Managing Harmful Behaviour

- Action must be taken to manage bird behaviour at the onset of an outbreak of feather pecking or cannibalism.

6.8 Physical Alterations

- Beak trimming must be carried out only by competent persons
- If beak treatment is necessary, the initial trimming must be done most preferably at the hatchery or, should be done at the latest on 20-day old ducks (54)
- Equipment must be properly maintained and adjusted prior to performing any beak treatments.

6.9 Controlled Moulting

- Controlled moulting practices must be performed under veterinary supervision. Only healthy birds must be selected for moulting.
- Feed or water must not be withdrawn to initiate moulting.

Section 7 - Transport

7.1 Evaluation for Transport

- In preparation for transport, the flock must be evaluated for fitness and those birds that are deemed unfit for transport must be euthanized, separated, or transported with special provisions for veterinary assessment or treatment only.
- Wet birds must not be loaded in cold weather if there is a risk that birds will become chilled.

7.2 Preparing for Loading and Transport

7.2.1 Pre-Loading Considerations

- The flock and environmental conditions, as well as the expected journey duration, must be taken into consideration when loading birds for transport.
- The number of birds in each container must be determined prior to loading, taking into consideration the available container floor space, body size/weight, prevailing environmental conditions, and duration of transport.

7.2.2 Feed and Water: Pre-Loading

- Pre-transport feed withdrawal must be managed to minimize the time that birds are off feed.
- Water must be available to the birds until catching commences.

7.2.3 Birds Left in Barns

- Birds that are not loaded for transport and not euthanized must continue to be cared for in accordance with relevant sections of this Guide (e.g. feed and water, temperature, ventilation).

7.3 Catching, Loading, and Unloading Procedures

- Catching crews must be supervised by a competent individual.
- Birds must be handled in such a manner that minimizes stress and/or injury.
- Producer or a competent designee must be readily available to provide assistance throughout the catching and loading process.
- All catching and loading equipment must be operated by competent personnel.
- The catching area must promote safe and humane handling and catching.
- Birds must be in an upright position after being loaded into containers.
- Containers with birds must be handled, moved, and securely positioned on vehicles in a manner that minimizes stress and/or injury to birds
- Birds must be loaded in containers in such a way that permits all of them to rest on the floor at the same time when evenly distributed, while preventing excessive movement within the container.
- Parts of birds must not protrude from containers in any way that can cause injury or impede movement.

7.4 Catching and Loading/Unloading Equipment and Containers

- The design, construction, space, state of repair, and use of containers and equipment must allow the birds to be loaded, conveyed, and unloaded in ways that minimize stress and/or injury.
- Conveyors used for loading containers of live birds must prevent tilting of containers that causes birds to pile up.

7.5 Facilities Design and Maintenance

- When building new barns or renovating existing barns or yards, the way in which birds are moved into and out of barns must be taken into consideration with a view to facilitating safe and humane transfer of birds to and from the transport vehicles (e.g. tractor-trailer).
- Openings through which birds are passed must be large enough to ensure that birds can be transferred in a way that minimizes injury.

- Driveways and yards must be maintained to facilitate unobstructed, safe, and easy access by transport vehicles.

Section 8 – Euthanasia

8.1 Euthanasia at Hatcheries

- An acceptable method for euthanizing ducklings must be used. Refer to Appendix B - Methods of Euthanasia.
- Eggs with the possibility of live embryos that have been culled must be euthanized. Refer to Appendix B: Methods of euthanasia.

8.2 Decision-Making around Euthanasia

- Personnel must be competent in making timely euthanasia decisions.
- Sick or injured birds and birds that exhibit obvious signs of pain must be promptly treated or euthanized by competent personnel.

8.3 Skills and Knowledge Related to Euthanasia

- All individuals who perform euthanasia must be competent in the euthanasia methods and protocols used on-farm.

8.4 Methods of Euthanasia

- An appropriate method for euthanizing birds, as contained in Appendix B: Methods of Euthanasia must be used.
- Prior to being euthanized, birds must be handled in a manner that minimizes pain, suffering and anxiety.
- All equipment used for euthanasia must be well maintained, used correctly, and not overloaded, so that it operates effectively and efficiently.

8.5 Confirmation of Insensibility and Death

- Birds must be inspected for signs of sensibility after the euthanasia method has been applied.
- If signs of sensibility are observed after the application of a euthanasia method, a second application of the euthanasia method or an alternate method must be immediately administered.
- Death must be confirmed before leaving birds and disposing of carcasses.

Section 9 – Mass Depopulation

- A mass depopulation plan must be available or accessible.
- If not using a method listed in Appendix B: Methods of Euthanasia, methods for depopulating large groups of birds on-farm must be undertaken in consultation with a veterinarian.
- Individuals who are involved in mass depopulation must be competent in the methods used.
- All equipment used for depopulating birds must be maintained in good working order.
- Death must be confirmed before disposal of birds.