



Controlled Atmosphere Stunning

June 06, 2024

Preamble

After a few years of research and many visits to different poultry slaughtering facilities in Canada and abroad and after many consultations with experts in the field, we are issuing this Fatwa about the permissibility of eating gas-stunned birds but within clear standards. The following has been prepared exclusively for the Halal Monitoring Authority (HMA) here in Canada for their certification of The Maple Leaf plants in London and Edmonton after members of the Fiqh Majlis of Canada visited the London plant on May 30, 2024. In this document, the reader will find after the Fatwa the references and documentation on which we based our conclusions as well as our conditions and collective stance on the issue given the evidences that we either found or we received from different sources on this specific issue.



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
الحمد لله والصلاة والسلام على رسول الله وآله وصحبه ومن والاه

In the name of Allah, the Most Gracious and the most Merciful
May Allah's Blessings and Peace be showered on His Prophet Muhammad, his family
and those who follow his path.

Statement on Controlled Atmosphere Stunning (CAS)

Toronto, June 06, 2024

Given the fact that the Canadian Food Inspection Agency (CFIA) ensures through its supervising inspectors that meats of dead animals and birds are removed from consumption and maximum hygiene is met during meat production and after an exhaustive discussion among the members of the Fiqh Majlis of Canada and based on: (a) the statement of Majma'ul Fiqh on this issue¹, (b) the attached research papers and field documentations by the Halal Monitoring Authority (HMA) and (c) the various discussions with expert scientists and review of their reports² herein attached, the Fiqh Majlis would like to state the following:

[The chicken that was slaughtered in a Halal Islamic manner after being stunned by gas through Controlled Stunning Atmosphere (CAS) is permissible (Halal حلال) and Pure (Tayyib طيب) to consume for Muslims so long as it is alive before slaughter. The following conditions must be met to deem the unconscious bird to be alive:

- 1. Its body temperature should be the same as it was before stunning,***
- 2. It has an active pulse and heartbeat,***
- 3. Its blood is thoroughly drained as it would from a non-stunned bird***
- 4. It is flaccid (not firm and stiff)***
- 5. Its colour is normal not reddish***

Ideally, stunning - whether by electricity or gas - should be avoided but if it is necessary like in our case here in North America where poultry is in mass production in tens or even hundreds of thousands per day, the procedure does not render the meat haram. Stunning helps speed up the process as it makes the bird unconscious and insensible thus less moving and flapping. We

¹ International Islamic Fiqh Council of OIC, July 03, 1997: Item 7 of Article 5 which reads: **It is not prohibited to consume the meat of an animal lawfully slaughtered after stunning it by using a mixture of carbon dioxide and air or oxygen or by using a round-headed gun that would not cause the death of the animal before...**

² Please carefully review the attached documents for more details

also emphasize that time is of essence and the duration between stunning and killing of the bird should not exceed 2 minutes to be on the safest side. We hereby stress that every plant is different and this Fatwa cannot be generalized as every case has to be audited distinctly.

Signed: 

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Chairman, Fiqh Majlis of Canada on behalf of the following below-mentioned esteemed scholars

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Our Fiqh Majlis's Ruling in Regards to Gas Stunning

The poultry industry is a very important business in our economy. Government regulatory bodies are active and mindful of protocol applications and consumer health and safety. The Canadian Muslim community has always pushed for chicken slaughter houses to supply halal chicken meat. Throughout the years, the journey was long and required first getting meat supply from farms and at an industrial level, establishing meat shops, followed lastly by running slaughter houses. However, the majority of the business are owned by non-Muslims. For them, it is a business practice and not a religious duty as a result of some halal monitoring organizations convinced them to enter into the halal food market given its growing and profitable margins.

Furthermore, while we have not been able to get the “halal” word officially registered as a logo, it is recognized by relevant authorities.

In regards to the slaughtering process, to kill a bird, the Code of Humane Societies must be followed as required by law to inflict the least amount of pain on the animal. Under this law, it is essential for both halal and non-halal meat slaughtering to either let the bird lose consciousness by electric shock or gas stunning.

In the early days, we allowed the electric shock method (used with minimum power). However, the limitations to the electric shock method were that after using it, the bird would usually only quiet down and oftentimes wake up again. After that, gas stunning was introduced as a safer and less painful technique. We hereby allow its usage on the condition that the minimum level of gas stunning is applied so that the bird would be killed in due time (according to the Halal meat slaughtering procedure).

The Canadian halal food industry is fast growing because the consumption of chicken has increased by multiple folds. While there are many halal standards, there are two that are the most recognized:

1. Knife slaughtering method
2. Machine slaughtering method

Halal meat that is imported from other countries is considered to be halal when the halal authority of that country gives it their stamp of approval (many of these imported meats also have used gas stunning).

Both methods agree to the use of gas stunning on the condition that three qualifiers were met:

1. The bird is only unconscious not dead (i.e., the bird must be alive at the time of the killing)
2. The bird is warm and shows signs of life
3. The bird's blood flow is normal

Canada regulates the meat industry for all processing types including halal, kosher and conventional methods. As scholars of Islamic law, we always do our utmost effort to follow Islamic Jurisprudence to its highest level based on the extra level of Hukm (ruling). However, under shariah guidance, we are allowed to follow the minimum level of Hukm.

As such, keeping halal as halal and accounting for Canadian legal restrictions (which may not allow for the highest level of Hukm), it is still permissible to use gas stunning (on the lowest power level and keeping to the three qualifiers mentioned above).

Signed,



Imam Dr. Mohammad Iqbal Alnadvi
Chair, Fiqh Majlis of Canada
Chair, Canadian Council of Imams

Dated: May 6th, 2024



Animal Slaughters

July 03, 1997 | Sharia Rules of Zakat, Halal Industry

In the Name of Allāh, the Entirely Merciful, the Especially Merciful

Praise is due to Allāh, Lord of the worlds, may the blessings and peace be upon our master Muḥammad, the last of prophets, on his family, and all his companions.

Resolution No. 95 (3/10) Animal Slaughters

The Council of the International Islamic Fiqh Academy of the Organization of the Islamic Conference, holding its 10th session in Jeddah, Kingdom of Saudi Arabia, on 23–28 Ṣafar 1418h (28 June – 3 July 1997),

Having examined the research papers submitted to the Academy concerning *Animal Slaughters*,

Having listened to the discussions on the subject with the participation of Fiqh scholars, medical and nutrition specialists,

Having recalled that animal slaughtering is one of the issues subject to Shariah rulings confirmed by the Quran and the Sunnah,

Having considered that observing these rulings is part and parcel of the respect towards Islamic rites and symbols distinguishing Muslims from non-Muslims, as the Prophet SAW said, “He who does his prayer as we do; who turns his face as we do towards the Qibla, who eats the meat of the animal we have slaughtered, is a Muslim and enjoys the protection of Allāh and His Prophet,”

Resolves

First: The lawful slaughter of an animal is performed in one of the following methods:

1. Cutting the animal’s throat (Dhabḥ): it consists of cutting the esophagus, the two jugular veins, and the pharynx of the This is the method preferred by Shariah for slaughtering cattle, sheep, goats, and poultry. It is also permissible for other animals.

2. Plunging a knife in the base of the neck (Nahr): This is the method preferred by Shariah for slaughtering camels and similar animals. This method is also permissible for the cattle.
3. Wounding ('Aqr): it consists in wounding an animal when there is no other choice, at any part of the body. This method is applied for wild animals hunting of which is lawful, or ferocious domestic If the animal is captured alive, it should be slaughtered using the first or the

second method.

Second: The lawful slaughter of an animal is subject to the following conditions:

1. The person performing the slaughter must be of appropriate age and enjoying full mental faculties; he must be a Muslim or belonging to the People of the Book (Jews or Christians). It is not permissible to eat the meat of an animal killed by pagans, atheists, non-believers, Magus, apostates, or any other disbelievers, at the exception of the People of the
2. The slaughtering must be performed with a sharp cutting instrument, either made of steel or other metal, capable of making the blood spurt, at the exception of teeth and fingernails which should not be used.

It is prohibited to eat the meat of animals killed by suffocation, or knocked out with a blunt object (stone, stick, etc.), or killed after a deadly fall from an elevated spot or in a ravine or after receiving a blow from the horn of another animal, or the remains of an animal devoured by wild animals or birds of prey not trained for hunting. Nevertheless, if the animal is captured alive, then slaughtered, it is lawful to eat it.

3. The person performing the slaughter must invoke the Name of Allāh at the beginning of the operation. The use of a recorded Tasmiyah (invocation of the Name of Allāh) cannot replace this act, but if the person performing the slaughter forgets to invoke the Name of Allāh, the meat of the slaughtered animal is indeed lawful for consumption.

Third: The slaughter of an animal should be performed in accordance with the rules of ethics prescribed by Shariah, like being merciful and gentle towards the animal, before, during and after the slaughter.

The sharpening of the instrument should not be done in front of the animal. An animal should not be slaughtered in front of another animal. It is forbidden to kill an animal with a non-sharpened instrument. The animal to slaughter should not be tortured. No part of its body should be cut off and it should not be skinned, or thrown into boiling water, or plucked, before one makes sure it is completely dead.

Fourth: The animal to be slaughtered must be free from any contagious disease that would alter the consistency of its flesh and be harmful to the consumer's health. This sanitary requirement is imperative concerning the meat sold on the marketplace or imported.

Fifth:

1. The lawful slaughter must, in principle, be carried out without stunning

the animal, as the Islamic method, by its requirements and ethics, is the best because it is more merciful towards the animal and shortens its suffering. Therefore, competent authorities are called upon to develop the means and instruments to be used for the slaughter of large animals, so as to fully comply with these requirements.

2. While complying with the provisions of the above paragraph, it is permissible to consume the meat of a lawfully slaughtered animal after it has been stunned, if it is technically certified that the animal did not die from this operation before its slaughter. This procedure is defined by Muslim experts as follows:

1. Application of two electrodes on the temples or the animal's forehead or nape.
2. The voltage should be between 100 and 400
3. The electric power should be between 75 to 1 ampere for sheep and between 2 and 2.5 amperes for cattle.
4. The electrical shock should last 3 to 6
5. It is prohibited to knock out the animal with a needle gun, an axe, a hammer or by inflating it as in the English method.
6. It is prohibited to stun poultry with electric shocks, as experience has shown that many animals die before slaughter with this
7. **It is not prohibited to consume the meat of an animal lawfully slaughtered after stunning it by using a mixture of carbon dioxide and air or oxygen or by using a round-headed gun that would not cause the death of the animal before**

Sixth: Muslims living in non-Muslim countries must strive, through legal ways, to obtain permission to slaughter animals following the Islamic method, without stunning.

Seventh: Muslims travelling abroad or living in a non-Muslim country are allowed to consume the meat of lawful animals slaughtered by the People of the Book, after making sure it is free from any forbidden material. However, this meat is prohibited if it is proved that the animal has not been slaughtered according to the Islamic method.

Eighth: The slaughter of poultry or other animals should – in principle – be performed manually with the butcher's hand; however, it is not prohibited to use mechanic instruments for slaughtering poultry if conditions prescribed in

paragraph (2) above are met. It is also permissible to invoke the Name of Allāh once before the slaughtering of several animals, provided that there is no interruption in the process. If the operation is interrupted, the invocation should be repeated.

Ninth:

1. If meat is imported from countries where the majority of the population is from the People of the Book and where animals are killed in modern slaughterhouses, following

one of the lawful methods and abiding by the Shariah conditions in this regard in Paragraph (2), then their consumption is lawful, in compliance with the Divine Words, «The food of the People of the Book is lawful to » (Al-Mā'idah, 6)

2. The meat imported from countries where the majority of the population does not belong to the People of the Book are forbidden since there is a strong suspicion that the slaughter of the animals has been carried out by an unauthorized person in the regard of Shariah.
3. The consumption of meat imported from countries defined in the above paragraph (2) is permissible only if a certified Islamic institution supervises the slaughtering process and if the person operating is a Muslim or from the People of the

Recommendations

1. Call upon the governments of Muslim countries to approach the authorities of non-Muslim countries where Muslims live, in order to offer the Muslim community, the possibility of slaughtering animals using the Shariah-compliant method, without stunning.
2. In order to eliminate all problems related to the importation of meat from non-Muslim countries, it is necessary to implement the following measures:
 1. To develop livestock production in Muslim countries to achieve self-sufficiency in this field.
 2. To rely, to the extent possible, on importing meat only from Muslim
 3. To import live animals and slaughter them according to the Islamic method, to ensure that the Shariah conditions are fully
 4. To request the Organization of the Islamic Conference to establish a unified Islamic Authority to undertake control operations over

imported meats, thus creating an institution entrusted with the elaboration of detailed rules specifying Shariah requirements for slaughter, and to carry out control and supervision directly on site, with the assistance of experts in Shariah and technicians. A distinctive trademark registered and protected internationally by law should be stamped on the meat certified by this authority.

1. To endeavor making the institution mentioned in paragraph (d) the only authority entrusted with this control task and to call upon Muslim countries to recognize this exclusive
2. Pending the implementation of the recommendation contained in paragraph (d) above, meat importers and exporters are requested to commit themselves to full compliance with the Shariah conditions for slaughtering any animal intended for consumption in Muslim countries, in order to prevent Muslims from falling into prohibited acts by resorting to effortless solutions and importing meat without ensuring at the outset that the animal has been slaughtered in accordance with Shariah.



June 7, 2024

Organizational Stance on Controlled Atmospheric Stunning (CAS) / Gas Stunning

Controlled Atmospheric Stunning (CAS), commonly known as gas stunning is a rather new technique employed in Canada at the pre-slaughter phase of poultry slaughter. The Halal Monitoring Authority (HMA) of the Canadian Council of Muslim Theologians (CCMT) has thoroughly investigated the procedure for its usage in the slaughter of halal poultry. The concern that has been expressed by members of the community is that due to the irreversible nature of this stun, the birds subjected to this procedure may die before slaughter. It should be noted that ensuring that the stun is reversible is not a fiqh premise but more of a precautionary measure to ensure life in the bird at the time of slaughter. More importantly, the Canadian Food Inspection Agency (CFIA) requires that birds that have died prior to the stunning-slaughter steps are detected and removed either before or after gas stunning and do not enter the food chain thus compromising food safety.¹

In Islamic Law, all animals that enter a terminal state are permissible for consumption provided they are alive at the time of slaughter.² For animals that are additionally immobile while terminal, one of two factors is required to ascertain life: (1) non death related movements (2) blood flow at the time of slaughter that resembles the flow of blood of a regular animal when slaughtered.³

Since the prime objective of CAS is to render the bird insensible by eliminating all movement, the HMA has stipulated that both the Islamic and Industry standards of ascertaining life are found in the bird at the time of slaughter for it to be fit for halal consumption. The criterion is as follows:

1. The bird is flaccid
2. Its body temperature is the same as a pre-stunned bird
3. It has an active pulse and heartbeat that is observable on a pulse oximeter and ECG
4. Its blood is thoroughly drained as it would from a non-stunned bird

¹ <https://inspection.canada.ca/food-guidance-by-commodity/meat-products-and-food-animals/guidelines-for-stunning-techniques/eng/1538160892409/1538160892704#a18>

² Ka' b ibn Mālik ؓ reported that he had a flock of sheep that would graze at Sal'. A slave girl of ours saw a sheep from our flock dying, so she broke a stone and slaughtered it with it. Ka' b ؓ told his family, "Do not eat it until I ask Allāh's Messenger ﷺ or send someone to ask him." He then either asked the Prophet ﷺ about this or sent someone to do so. The Prophet ﷺ instructed them to eat it. (Ṣaḥīḥ al- Bukhārī 2304)

³ Radd al-Mukhtār 6:308

It should be noted that dead birds retain their blood at the time of slaughter thus classifying them as red or dark birds and are easily detectable.

Till date, the HMA has approved of two facilities for their CAS operations:

1. Maple Leaf Inc. Edmonton AB Est. 7F where the line speed is 110 birds a minute, the CAS is set on 55% at exit, and the minimum time from CAS to slaughter is 0:42 min. while the maximum time is 1:12 min.
2. Maple Leaf Inc. London ON Est. 901 where the line speed is 225 birds a minute, the CAS is set on 61% at exit, and the minimum time from CAS to slaughter is 0:35 min. while the maximum time is 1:24 min.

Declaring something as halal or haram is a fiqh issue, not a scientific one. Although scientific data may be considered when investigating certain matters, it will never serve as the foundation for any Islamic ruling. Islamic rulings are derived from the Qur'an, the Sunnah and the principles and guidance deduced from them. Hence, the HMA, being one of the largest body of scholars serving in the field of halal, have engaged other scholarly bodies and institutions on the matter of CAS. It have shared its research with them and has arranged for them to view the certified operations firsthand. As a result, their ruling on the matter is based on their insight of fiqh and independent of any influence from the HMA. One such scholar that has viewed both the data and the operation is the world-renowned Mufti Ateeq Ahmad Bastawi from the Islamic Fiqh Academy India. He has written:

“Today, April 2nd, 2024, corresponding with the 23rd of the blessed month of Ramadan, 1445 during my visit to Canada, I had the opportunity to visit Maple Leaf London, Canada with Moulana Saeed Faizi (may his honour be increased) and Moulana Mohammed Omar Subedar. There, a detailed observation was made on how the chickens were being slaughtered. Upon the live birds being rendered unconscious through CAS, they were slaughtered with a knife [manually] with bismillah recited [upon them]. There is satisfaction [in me] that the birds are alive at the time of slaughter. We calmly watched the entire process and had the opportunity to understand it. With Allah’s praise, I affirm that at the time of slaughter, the birds are alive at the aforementioned abattoir. Muslim slaughterers slaughter them reciting bismillah. According to my detailed observation, there is no doubt in the halal status of these birds.”

The HMA is aware of certain members of the business community that have exerted their efforts to cause commotion and aversion towards the organization on certain online platforms and in person for motives that are better known to them. We simply pray for their guidance and ask the readers to do the same.

For the ease of the community, the HMA has prepared a report detailing all the different dimensions for its consideration of approving CAS titled “Navigating the Tide of CAS in Muslim Minority Communities.” The report reveals the industry realities of Canada, the various forms of tests the HMA has conducted both independently and in conjunction with a certified Vet, the peer review of avian experts such as the Poultry Health Services and the procedures it has adopted to ensure compliance with its halal criterion.

Upon viewing three sets of ECG tests Dr. Ben Schlegel and Dr. Tom Inglis from Poultry Health Services have written:

“These reports demonstrate that heartbeats are routinely present in birds that have been exposed to controlled atmosphere stunning at these facilities, which is considered a sign of life. The birds are irreversibly stunned but physiologically maintain heart activity and blood pressure consistent with and comparable to other approved forms of stunning (electrical low voltage, high amperage and low atmospheric pressure).

It should be noted that even with high voltage, low amperage stunning which induce cardiac arrest, the birds are considered, insensible but alive at the time of bleeding. Unlike the event of simultaneous cardiac and brain interruption through electrical stunning, in CO2 stunning the brain activity will cease prior to the cardiac function. In addition to the findings of this report, it is worth noting that any bird which was dead at the time of cutting would not have adequate blood pressure to bleed out and would be removed from the line as a DOA carcass (dark bird).”

In conclusion, the CAS operations that the HMA has certified till date are in complete compliance with the fiqh rulings of halal. The HMA does not declare that all CAS operations are halal compliant. Like electric waterbath stun, each operation must be regulated prior to being accepted as halal. The HMA is a department of the Canadian Council of Muslim Theologians, a federally registered non-for-profit organization striving for the welfare of the Muslim community.

Board of Directors
Halal Monitoring Authority

Navigating the Tide of Controlled Atmospheric Stunning (CAS) in Muslim Minority Countries

Imam Omar Subedar

Halal Monitoring Authority



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What is Controlled Atmospheric Stunning (CAS)?

Controlled Atmosphere Stunning (CAS) is a pre-slaughter stunning method used for poultry, among other animals that employs the induction of gases to achieve progressive loss of consciousness in birds thus making it easy for them to be hung and slaughtered with minimal suffering. This method varies from Controlled Atmospheric Killing (CAK) where animals are euthanized through the induction of gases within the chamber they are held, consequently reducing their exposure to oxygen and resulting in their death.¹

For CAS, birds are placed in a crate at the grow-out farm, transported to a designated abattoir, stunned in the very same crates and are hung upon exiting the CAS station. This results in them being minimally handled in a conscious state, which is considered a major advantage for animal welfare.

All birds that die prior to stunning are detected and removed either before or after gas stunning. They are not to enter the food chain and compromise food safety.²

Why consider CAS for Halal slaughter in Canada?

Canada is currently home to approximately 1.8 million Muslims,³ making them 4.9% of the country's population. This is double what they were in 2001 at 2%. Islam is the second most reported religion in the country, trailing behind Christianity. In 2022, Canada welcomed 273,535 immigrants, of which 62,349 (23%) were from Muslim Countries such as Afghanistan, Nigeria, Syria, Pakistan and Iran.⁴ With nearly one in every four new immigrants being Muslim, the Muslim population is projected to grow to 2.7 million by 2030.

¹ <https://inspection.canada.ca/food-guidance-by-commodity/meat-products-and-food-animals/slaughter-methods-and-monitoring/eng/1539372028443/1539372028884?chap=5>

² <https://inspection.canada.ca/food-guidance-by-commodity/meat-products-and-food-animals/guidelines-for-stunning-techniques/eng/1538160892409/1538160892704#a18>

³ https://www.google.com/search?q=muslim+population+in+canada&rlz=1C1GCEA_enCA963CA963&oq=muslim+&aqs=chrome.2.69i57j0i67i650l2j46i67i175i199i650j0i67i650j0i67i131i433i650j0i67i650l2j0i433i512j0i512.4231j0j15&sourceid=chrome&ie=UTF-8

⁴ <https://www.cicnews.com/2023/02/ircc-unveils-the-top-10-source-countries-of-new-immigrants-to-canada-in-2022-0233180.html>

These growing numbers undoubtedly pose a great challenge for the accessibility of halal poultry in Canada for a few reasons. Firstly, poultry in Canada is regulated by a quota system.⁵

Canadians do not have the liberty to mass produce or import poultry outside of the system.

Secondly, the corporate philosophy that has been embraced on animal welfare throughout the Canadian poultry industry is that birds should be insensible at the time of shackling and bleeding. This can only be successfully accomplished through CAS, as opposed to the electric water bath system where 100% of the birds are conscious at the time of shackling while a small percentage of them remain so at the time of bleeding. It is for this reason that many major poultry abattoirs in the country have either made the switch from electric water bath stunning to CAS or are planning to do so soon.

Thirdly, there are five major companies producing halal fresh poultry for major retail outlets in Canada:

Brand	Company & Produced by	Type of Slaughter	Type of Stunning	Halal Certifier
Mina Halal	Maple Leaf Foods Inc.	Manual/Hand	CAS	HMA
Sufra Halal	Loblaws Companies Limited produced by Maple Leaf Foods Inc.	Manual/Hand	CAS	HMA
Zabiha Halal		Mechanical	CAS	CHFCA

⁵ <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2002-36/FullText.html>

	Maple Lodge Farms			
Kirkland	Costco Wholesale Canada produced by Sofina Foods Inc. (Calgary) & Maple Lodge Farms	Mechanical	CAS	CHFCA
Zamzam	Sofina Foods Inc. (Port Coquitlam)	Manual/Hand	Electric Waterbath	HMA

According to Nielson Market Track, in 2022 there was 233,134,175 kgs of fresh chicken sold at retail in Canada. 10,803,816 kgs of that was halal. 92% of that halal chicken was stunned through CAS.

There are smaller operations that are provincially regulated and either use the electric water bath stun or no stun at all. They cater to second-tier markets such as small grocery chains, restaurants and processing facilities however, they do not possess the capacity to fulfill the current growing market demand. The following are examples of such operations:

Company	No. of birds killed per day	No. of days of operation	Type of stunning	Halal Certifier

Sargent Farms	40,000	5	Electric Waterbath	HMA
Sheik Halal Farms	5000 to 7000	4	Electric Waterbath	HMA
Sofina Foods	16,000 to 17,000	5	Electric Waterbath	HMA
Clarington Poultry	5000 to 7000	4-5	Electric Waterbath	HMA

Compare them to Maple Leaf Foods Inc., a federal establishment that has halal operations in Ontario and Alberta. In its London, ON plant, it currently slaughters approximately 400,000 chickens a day, five days a week.

Suggesting that Muslims begin their independent operations, although ideal is impractical to satisfy the current market demand as well. For example, in Ontario where 62% of all halal fresh chicken in the country was sold at major retail in 2022, the maximum number of birds a farmer can produce annually, quota free is 300. They can either use these birds for personal consumption or sell them at their farm gate. If some Muslims decide to obtain their own quota, they would first be required to prove to the province that the current allocation does not satisfy consumer demand. If proven, the minimum quota that would be allocated to them would be 14,000 units annually. One unit in Ontario equals 12.08 kg of live chicken, which would be approximately 5 to 6 birds per unit depending on their size. This would allow them to produce a maximum of 90,000 birds for the entire year at a cost \$1.75 million according to Practical

Farmers and Sustain Ontario.⁶ They could look at the Artisanal Chicken program, which is designed for farmers wanting to grow 600 to 3,000 chickens annually for select target markets such as local retail outlets, restaurants and farmers' markets. For 2023, a total of 146 applicants have been approved with an average allocation of 1646 birds for the entire year.⁷ It is clear that this program as well would be of minimum benefit to current halal poultry market.

Another important point to note is that in recent years, there has been a push towards irreversible waterbath electric stunning both from federal and provincial health inspection agencies. There is a growing environment of aversion towards reversible stunning thus putting many poultry abattoirs who wish to maintain the status quo in a predicament.

Considering these realities, it is only logical that CAS be looked further into, and an attempt be made to make this system shariah compliant, as opposed to dictating to the Canadian Muslim community that CAS is categorically haram based on the position that other certifying bodies in the world have taken. Issuing such fatwas prior to doing research would undoubtedly put the community into undue hardship (*haraj*).⁸

The Journey to CAS

In March of 2016, the HMA was informed by industry stakeholders that the poultry industry was going to begin a shift in their stunning procedures from the electric waterbath model to CAS. This was based on the belief that CAS is considered more humane for birds, better for animal welfare, and that many European countries had already made the shift. In the food industry, Canada typically follows Europe's lead and is usually five years behind them. This information was tabled to the Canadian Council of Muslim Theologians (CCMT) and it was decided that before dismissing the practice, the HMA should look more into it and then come back with their findings.

Hence, the HMA began researching CAS by studying multiple documents on what the procedure entailed. Documents such as "A Review of Different Stunning Methods for Poultry – Animal Welfare Aspects (Stunning Methods for Poultry)" by Charlotte Berg and Mohan Raj⁹ and

⁶ <https://www.betterfarming.com/online-news/groups-want-chicken-farmers-ontario-increase-quota-free-limit-11550#:~:text=Buying%2014%2C000%20minimum%20quota%20units,about%2090%2C000%20birds%20a%20year.>

⁷ <https://ontariochicken.ca/en/community-artisanal-chicken/>

⁸ *Haraj* is technically defined as every element that immediately or eventually leads to personal, physical or financial hardship above and beyond what has been sanctioned by the shari'ah.

⁹ *Animals*, 2015, 5, 1207-1219; doi:10.3390/ani5040407

Temple Grandin's article on Gas Stunning¹⁰ were reviewed while an effort to seek research material from other Islamic organizations throughout the globe on CAS was undertaken. There were a few fatwas that were obtained on the impermissibility of CAS but no research from any Muslim body was available for the HMA to review. The documents the HMA reviewed claimed that CAS:

- Did not result in immediate unconsciousness but induced it gradually
- Had several animal welfare and product quality advantages
- Kept the bird sedated long enough for brain death to occur at bleed out
- Is considered superior to electric waterbath stunning however, due to its historic connotations, the public may harbor negative sentiments towards it

In order to understand this procedure further, the HMA sent a delegation to GoldnPlump (GNP), a poultry abattoir located in Minneapolis, MN in November of 2016. This abattoir had implemented CAS in January of the same year and was slaughtering a million conventional birds a week. Upon witnessing the operation, the delegation felt that CAS may be doable for halal slaughter but with stipulations. As a result, after one year of research, the HMA developed some preliminary guidelines on the use of CAS for halal slaughter and then presented them to several Islamic Institutions throughout the world seeking their guidance and fatwa on the matter. The guidelines in brief were as follows:

1. The gas applied in the CAS Station must be 100% CO₂. No other gases may be used.
2. The maximum concentration that will be applied in the station will be 60%.
3. All birds must be alive at the time of slaughter supported by an adequate bleed out.
4. In the event of a mechanical breakdown, all birds in the CAS station until the slaughter area will be considered non-halal.
5. The electric waterbath stun will be used as a backup in the event of the CAS station being non-operational.

¹⁰ <http://www.grandin.com/gas.stunning.poultry.eval.html>

There are other technical guidelines that were formed however, they are not relevant for this report. It was also understood that the guidelines were open to modification if the HMA felt the need to amend them at any point.

After a period, fatwas were received from:

- The Academy of Research in Islamic Jurisprudence
- Darul Uloom Canada
- Jamiah Qasimul Uloom¹¹
- Mufti Khalid Rahmani

All have been published on the HMA website.¹²

The HMA then proceeded to test the application of the guidelines at Maple Leaf Foods Inc., Edmonton, AB in October of 2019. Since the birds were going to exit the CAS station with progressive loss of consciousness, the criterion that was developed to determine life in them at the time of slaughter was:

- All birds must be flaccid
- All post stunned birds must maintain the same body temperature as pre-stunned birds
- All birds must bleed the same amount as an electrically stunned bird
- All birds must have an active heartbeat at the time of slaughter

This criterion was decided considering what Ibn ‘Ābidīn al-Shāmī رحمته الله has written in his Radd al-Mukhtār, “Bazāzīyah has stated, ‘[It is written] in Ṭaḥāwī’s commentary: Blood coming out is not indicative of life except if it comes out the way it comes out from a living animal according to the Imam. This is the Ṣāḥih al-Riwāyah.’ [...] It is stated in Minaḥ: The principle is for something to remain in its default state. Hence, the cessation of life cannot be ruled on due to doubt. [...] Even if its life may be light [...] and that is by having enough life remaining it in that amounts to the life that remains in a slaughtered animal after being slaughtered [...]. This is what the fatwa is issued on.”¹³

¹¹ This institute has currently retracted their fatwa for modification purposes at the time of preparing this report.

¹² <http://hmacanada.org/what-is-halal/>

¹³ Radd al-Mukhtār 6:308

Imām al-Bukhārī has recorded in his Jāmi‘ al-Ṣaḥīḥ: Ka‘b ibn Mālik ؓ reported that he had a flock of sheep that would graze at Sal‘. A slave girl of ours saw a sheep from our flock dying, so she broke a stone and slaughtered it with it. Ka‘b told his family, “Do not eat it until I ask Allāh’s Messenger ﷺ or send someone to ask him.” He then either asked the Prophet ﷺ about this or sent someone to do so. The Prophet ﷺ instructed them to eat it.¹⁴

The Canadian Centre for Islamic Research and Iftā writes: In principle, an animal must be alive at the time of slaughter for it to be considered Halal. Regardless of the method utilized, determining its permissibility will depend on whether the animal was alive or not at the time of slaughter. Any minimal sign of life, such as an active heartbeat, would be sufficient.

Dr. Kathleen Long, a certified vet and the VP of Animal Care at Maple Leaf has written regarding controlled atmospheric stunned birds: In all cases, the detection of a regular heart rate is a sign of life.

To determine life in the birds based on the aforementioned criterion, a series of focused tests were conducted and continue to be conducted till this day to ensure that no compromise is made to the halal status of the slaughtered birds. The following are the tests that have been conducted to date:

Test 1: Post Stun Body Temperature and Bleed Test

Location: Maple Leaf Foods, Edmonton AB

Date: October 15, 2019

Specimen	Weight	Post Stun Body Temperature	Time After Exiting CAS	Total Blood Drainage

¹⁴ Ṣaḥīḥ al- Bukhārī 2304

1	2.35 kg	40.1 C	4 minutes	95 ml
2	2.2 kg	40.1 C	4 minutes	73 ml
3	2.2 kg	41.9 C	4 minutes	73 ml
4	2.2 kg	40.1 C	4 minutes	76 ml
5	2.2 kg	40.5 C	4 minutes	77 ml

The stunner was set at 55% upon exit. The distance between the first hanger and the last slaughterer was 1:12 minutes while the distance between the last hanger and the first slaughterer was 42 seconds. The line speed was set at 110 chickens per minute. The average temperature of a non-stunned adult bird is between 40.6 C to 41.7 C. Dead birds are easily detected by the hangers as they are stiff and cold. An example of a live bird vs. a dead bird can be observed in the picture below:



The bird on the left is a dead bird pulled out by the hangers post CAS. Notice that it is stiff while the bird on the right is flaccid and warm.

The reason why blood drainage was tested was because dead birds don't bleed out the way a live bird does. A dead bird retains blood in the body and ultimately becomes a "red bird," which would be pulled out at evisceration. Such birds are condemned and are immediately discarded of. The following are samples of red birds:





Halal chicken that has been properly bled

An interesting observation that was made was that CAS chickens bled 10% more than electrically stunned birds at this facility. The average amount that a CAS chicken of 2.2 kg bled was 75 ml while that same size bird that was electrically stunned bled an average of 61 ml. The two are visually different as well. The CAS chicken is clearly whiter than an electrically stunned bird as can be observed below:



Electrically stunned birds at Maple Leaf Foods, Brampton ON Est. 196



CAS birds at Maple Leaf Foods, Edmonton AB Est. 7F

Another observation that was made was that both the CAS bird and the electrically stunned bird bled in the same manner. There was no difference in the way the blood flows out from the throat upon being cut as the pictures below demonstrate:



Electrically stunned bird bleeding out immediately after slaughter at an HMA certified facility



CAS bird bleeding out upon slaughter at Maple Leaf Foods, London ON Est. 901

Test 2: Post Stun Pulse Test

Location: Maple Leaf Foods, London ON

Date: March 3, 2023

Specimen	Pulse Reading	Time	Test Place
1	80 bpm	2:12 min	Leg
	75 bpm	2:50 min	Leg
	67 bpm	3:00 min	Leg
2	94 bpm	1:14 min	Wing
	92 bpm	1:34 min	Wing
	121 bpm	2:50 min	Leg
3	108 bpm	1:20 min	Leg
	108 bpm	1:37 min	Leg
	89 bpm	2:14 min	Leg
4 (DOA)	0	0	Leg
5 (DOA)	0	0	Leg
6	89 bpm	1:30 min	Leg
	76 bpm	5:44 min	Wing
	49 bpm	6:18 min	Wing

A CM560D-VET pulse oximeter was used for this test. The stunner was set at 66% upon exit.¹⁵ The current distance between the first hanger and the last slaughterer is 1:23 minutes while the distance between the last hanger and the first slaughterer is 35 seconds. The line speed is set at 225 chickens per minute. Specimens 4 and 5 were taken from the pile of dead birds that were pulled by the hangers post-CAS to see whether they had a reading or not, and to compare them to the live birds that were being tested. It is clear from this test that all birds were alive at the time of slaughter.

¹⁵ It should be noted that the initial guideline of the maximum concentration being 60% that was set was in light of the operation that was implemented in Edmonton AB. In London ON, the CAS station is far larger and holds more birds. Hence, the concentration of 66% was permitted after witnessing that it did not produce any adverse results.



CM560D-VET Pulse Oximeter



Test being conducted



Sample Reading

Test 3: Post Stun Pulse Test

Location: Maple Leaf Foods, London ON

Date: July 23, 2023

Specimen	Pulse Reading/ BPM	Time	Test Place
1	65	2:29	Leg
	110	3:14	
2	59	1:35	Leg
	97	2:39	
	97	3:00	
3	61	2:22	Leg
	56	3:36	
4	80	1:55	Leg
	75	2:30	
	74	3:00	
5	83	2:05	Leg
	77	2:35	
	77	3:00	
6	79	2:58	Leg
7	74	1:20	Wing
8	141	1:38	Leg
9	113	2:29	Wing
	113	3:00	
10	100	1:08	Leg
	100	2:00	

The apparatus used, the CAS concentration, and the line speed were all the same as Test 2, which was conducted on March 3, 2023.

Test 4: ECG Test

Location: Maple Leaf Foods, London ON

Date: August 28, 2023

Specimen	ECG Reading	Minutes	Test Place
1	150	1:11	Both legs and one wing
	157	2:06	
	175	2:47	
2	212	1:09	Both legs and one wing
	240	1:40	
	244	2:18	
	252	2:31	
	NR	3:20	
3	NR	NR	Both legs and one wing
4	74	1:26	Both legs and one wing
	71	1:53	
	84	2:09	
	86	2:35	
	91	2:51	
	139	3:10	
	NR		
5	45	1:06	Both legs and one wing
	40	1:50	
	78	2:00	
	65	2:17	
	NR	2:30	
6	111	1:10	Both legs and one wing
	134	1:30	
	NR	2:00	
7	98	1:25	Both legs and one wing
	104	1:41	
	100	2:00	
	112	2:23	
	121	2:41	
	NR	2:54	
8	176	1:24	Both legs and one wing
	181	2:00	
	187	2:30	
	NR	2:45	
9	86	1:07	Both legs and one wing
	83	1:30	
	77	1:53	
	80	2:17	
	78	2:50	
	154	3:00	
10	103	1:26	Both legs and one wing
	113	1:40	
	118	1:55	
	115	2:40	
	137	3:00	

11	210	1:02	Both legs and one wing
	160	1:35	
	150	1:52	
	123	2:18	
	101	2:41	
	235	3:04	
12	140	1:29	Both legs and one wing
	NR	2:20	
13	115	1:00	Both legs and one wing
	250	1:45	
	315	1:51	
	272	2:22	
	NR	2:40	
	34	3:00	
14	242	1:10	Both legs and one wing
	250	1:23	
	255	1:42	
	96	1:53	
	93	2:22	
	86	2:36	
	89	2:50	
	90	3:00	
15	124	1:18	Both legs and one wing
	125	1:30	
		2:03	
	80	2:20	Both legs and one wing
16	170	1:05	
	173	1:30	
	169	1:53	
	67	2:37	
	NR	2:50	
	24	3:00	
17	268	1:14	Both legs and one wing
	263	1:33	
	220	1:53	
	NR	2:04	
18	97	1:00	Both legs and one wing
	212	1:13	
	100	1:28	
	222	1:45	
	208	2:00	
	184	2:24	
	101	3:00	
19	80	1:55	Both legs and one wing
	82	2:07	
	80	2:33	
	65	2:55	
20	70	1:08	Both legs and one wing
	83	1:26	
	195	1:55	
	131	2:06	
	62	2:36	
	65	3:03	

21	45	1:28	Both legs and one wing
	44	1:55	
	NR	2:07	
	NR	2:30	
	NR	3:00	
22	73	1:11	Both legs and one wing
	NR	2:27	
	NR	3:00	
23	27	1:09	Both legs and one wing
	176	1:22	
	93	2:02	
	192	2:18	
	120	2:34	
	66	2:45	
	57	2:56	
24	128	1:21	Both legs and one wing
	282	1:45	
25	30	1:54	Both legs and one wing
	82	2:10	
	NR	2:25	
	23	2:57	
26	83	1:26	Both legs and one wing
	NR	2:12	
	70	2:28	
27	200	1:15	Both legs and one wing
	205	1:34	
	195	1:52	
	210	2:09	
	214	2:33	
28	39	1:21	Both legs and one wing
	81	1:31	
	67	1:47	
	76	2:00	
	80	2:08	
	75	2:20	
	88	2:30	
	91	2:58	
29	240	1:49	
	73	2:01	
	165	2:25	
	201	2:40	
	200	3:00	
30	201	1:40	Both legs and one wing
	212	1:53	
	128	2:15	
	NR	2:28	
31	101	1:11	Both legs and one wing
	250	1:21	
	94	1:37	
	114	2:00	
	131	2:27	
	113	2:54	
	122	3:19	
	50	4:19	
	NR	4:33	

*NR= No Reading

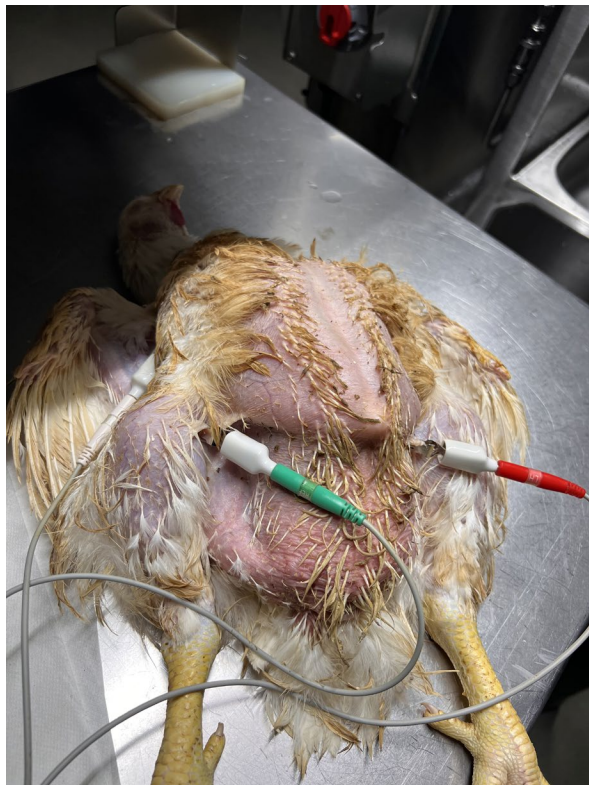
This test was conducted by Dr. Kathleen Long, the VP of Animal Care at Maple Leaf Foods along with an assistant of hers in the presence of two HMA personnel. Select birds were taken upon exiting the CAS station and were connected to a three-lead PC-VetChek wireless ECG monitor. It took approximately one minute for the birds to be taken from the hangers' station, brought to the test table and hooked up to the device. Hence, all readings began after the one-minute mark. The readings above were recorded by the HMA at different intervals, independent of Dr. Kathleen's readings. There were clear connection issues with the device being used as a heartbeat would disappear and reappear on the monitor regularly. Birds that didn't show a reading at the time of the recording were marked as NR. The birds were taken from the non-halal operation and were tested for a maximum of 3.5 minutes. Thereafter, they were returned to the line. The three-minute mark was chosen to be the cut-off for the testing as it is more than double the time it takes for a halal bird to be slaughtered post-CAS. The stunner again was set at 66% upon exit.

Upon concluding the tests, three birds were taken from the slaughter area, slaughtered and measured for blood drainage. The average bird size was 2.3 kg. The results were as follows:

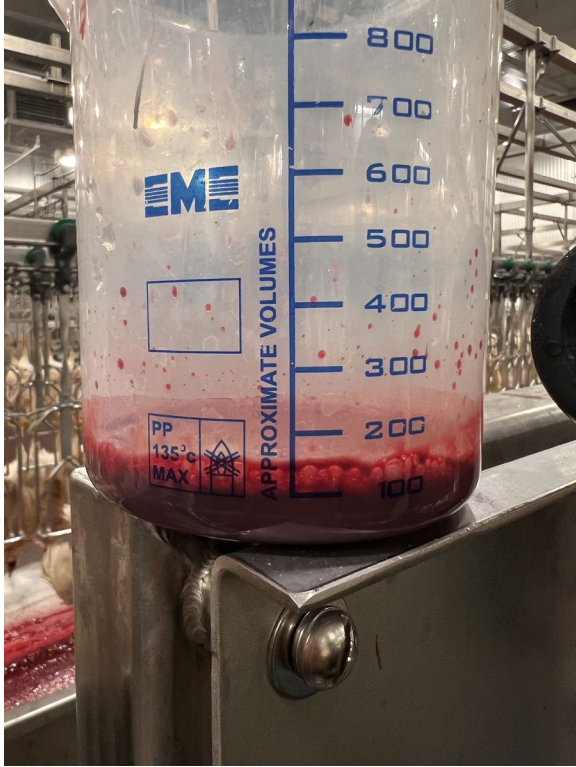
- Bird 1: 100 ml
- Bird 2: 98 ml
- Bird 3: 105 ml



PC-VetChek Wireless ECG Monitor



Bird being tested



Blood drainage of Bird 1

Test 5: ECG and Pulse Test

Location: Maple Leaf Foods, London ON

Date: August 29, 2023

Specimen	ECG Reading	Pulse Reading	Minutes
1	125	NR	1:27
	84	70	2:15
	28	NR	2:35
	NR	70	2:47
	NR	47	4:14
	NR	47	4:30
2	100	NR	1:24
	95	NR	2:00
	60	NR	2:39
	NR	51	2:56
	NR	52	3:36
	148	52	3:51
3	62	NR	1:24
	90	NR	1:35
	NR	142	2:20
	147	NR	2:40
	NR	123	3:40
	NR	123	4:00
4	164	NR	1:29
	105	39	1:34
	63	NR	2:05
	45	NR	2:22
	NR	49	3:07
5	26	NR	1:09
	169	NR	1:30
	171	NR	1:43
	165	NR	2:03
	71	53	2:30
	41	58	2:51
	86	58	3:14
6	205	NR	1:30
	208	NR	1:47
	51	NR	2:11
	NR	NR	2:19
	NR	96	2:43
	NR	96	3:15
7	45	NR	1:30
	NR	112	2:05
	NR	121	2:25
	73	NR	2:44
	111	NR	3:00
8	82	NR	1:04
	85	NR	1:30
	89	NR	1:49
	83	NR	2:00
	78	NR	2:21
	75	NR	2:50
	NR	51	3:30
	NR	NR	NR
9	220	NR	1:24
	80	NR	1:38
	75	NR	1:53
	96	113	2:03
	140	NR	2:18
	NR	165	2:40
	NR	165	3:06
10	154	Not Tested	1:11
	152	Not Tested	1:23
	130	Not Tested	1:47
	110	Not Tested	2:10
	NR	Not Tested	2:33

Dr. Kathleen Long along with an HMA representative conducted this test using both the PC-VetChek wireless ECG monitor and the CM560D-VET pulse oximeter. The purpose of this test was to observe whether absent readings from the ECG monitor were due to the absence of a heartbeat or a connection issue. All specimens were first connected to the ECG monitor prior to being connected to the pulse oximeter. Hence, the delay in the readings of the pulse oximeter in the results above. There was a clear discrepancy between the readings of both devices. The pulse oximeter typically had a lower reading than the ECG monitor however, it also had prolonged and consistent readings as opposed to the ECG monitor. One thing it did bring to light was that when the ECG was not picking a reading, the pulse oximeter was, which shows that the absence of an ECG reading is not necessarily due to the absence of a heartbeat.

Test 6: ECG and Pulse Test

Location: Maple Leaf Foods, Edmonton AB

Date: November 15, 2023

Specimen	ECG Reading	Pulse Reading	Minutes	Test Place
1	149	Not Tested	1:01	ECG: Both legs and right wing
	77		1:26	
	93		1:38	
	80		1:53	
	103		2:12	
	72		2:38	
	78		3:00	
	42		3:39	
	49		3:56	
	46		4:40	
	60		5:00	
	NR		5:29	
	2		NR	
177		NR	2:26	
NR		NR	4:00	
3	114	Not Tested	1:18	
	98		1:30	
	106		1:41	
	109		1:52	
	170		2:10	
	141		2:33	
	127		3:11	
	133		3:35	
	NR		3:54	
4	173	Not Tested	1:25	
	115		1:41	
	101		2:17	
	74		2:35	
	78		2:54	
5	237	112 95	0:38	
	282		1:15	
	237		1:28	
	130		1:53	
	171		2:37	
	120		3:38	
	76		4:16	
	58		5:02	
	52		5:25	
	55		5:47	
NR	6:00			
6	226	138	6:11	
	151		1:00	
	154		1:20	
	120		1:30	
	120		1:54	
	255		2:10	
	244		2:44	
7	172	99	3:02	
	176		3:10	
	101		0:45	
	114		1:03	
	129		1:21	
	73		1:45	
8	103	Not Tested	2:06	
	91		2:21	
	104		2:21	
	136		2:58	
	137		0:44	
	110		1:08	
	117		1:25	
			1:57	
			2:18	
			2:44	
			3:00	

9	205	81	0:46
	176		1:05
	180		1:30
	42		2:22
	NR		2:37
10	77	Not Tested	0:42
	240		1:05
	272		1:21
	64		1:52
	68		2:04
	88		2:26
	77		2:41
	52		3:01
11	138	Not Tested	1:01
	220		1:18
	100		1:53
	129		2:14
	141		2:27
	107		2:42
	85		3:04
12	162	103	0:57
	190		1:24
	50		1:37
	NR		1:48
	NR		2:25
13	90	Not Tested	1:17
	43		1:28
	180		1:38
	64		1:51
	NR		1:53
	42		2:12
	NR		2:20
14	94	Not Tested	0:54
	78		1:08
	150		1:29
	86		1:45
	181		2:03
	77		2:39
	88		2:56
15	176	Not Tested	0:33
	121		1:06
	121		1:30
	73		1:40
	42		1:50
	NR		2:00
16	177	99	0:39
	163		0:59
	177		1:26
			1:37
	179		1:58
	169		2:37
	198		2:58
17	222	Not Tested	1:08
	244		1:36
	222		1:57
	154		2:17
	NR		2:27

18	42	Not Tested	0:29	Average BPM Average BPM Flatline Flatline
	137		0:48	
	131		1:01	
	153		1:37	
	158		1:51	
	167		2:11	
	186		2:23	
	198		2:40	
	133		2:53	
	135		3:00	
19	76	Not Tested	0:39	
	83		2:02	
	62		2:19	
	57		2:34	
	64		2:49	
	40		3:03	
20	79	Not Tested	0:49	
	29		1:47	
	29		2:05	
	27		2:30	
	27		2:46	
	35		2:55	
21	101	Not Tested	0:55	
	110		1:13	
	131		1:35	
	47		1:50	
	NR		1:58	
Live Bird 1	275			
Live Bird 2	320			
DOA 1	NR			
DOA 2	NR			

Similar to the test that was conducted in London ON on August 29, 2023, this test was carried out by Dr. Kathleen Long along with two HMA representatives using both the PC-VetChek wireless ECG monitor and the CM560D-VET pulse oximeter. The results mimicked that of London while the size of the bird, the line speed and the amount of Co2 employed in the CAS stunner were identical to the test conducted at this very facility on October 15, 2019.

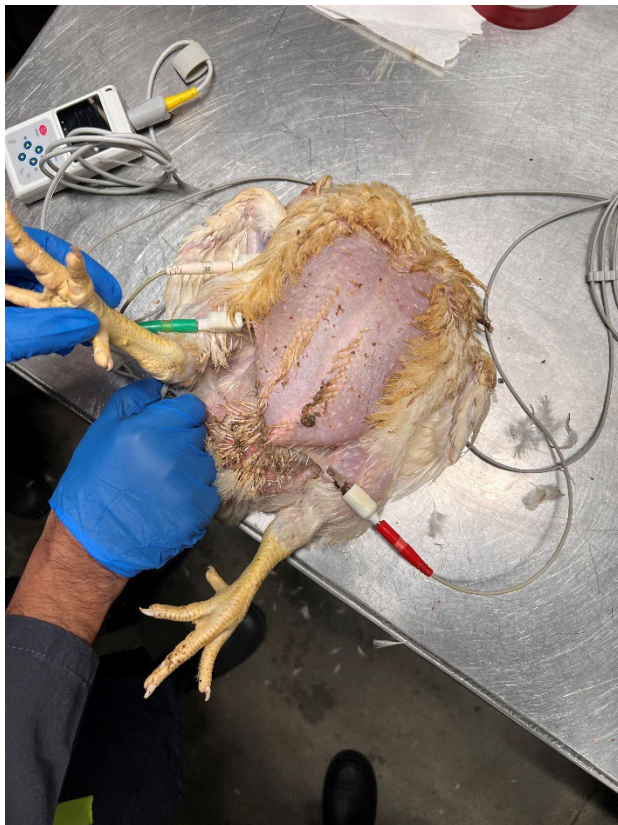
Dr. Kathleen's reports on the tests conducted at both the Edmonton and London facilities were sent over to Poultry Health Services¹⁶ for peer review. Upon studying her reports, the agency's conclusion was as follows:

"These reports demonstrate that heartbeats are routinely present in birds that have been exposed to controlled atmosphere stunning at these facilities, which is considered a sign of life.

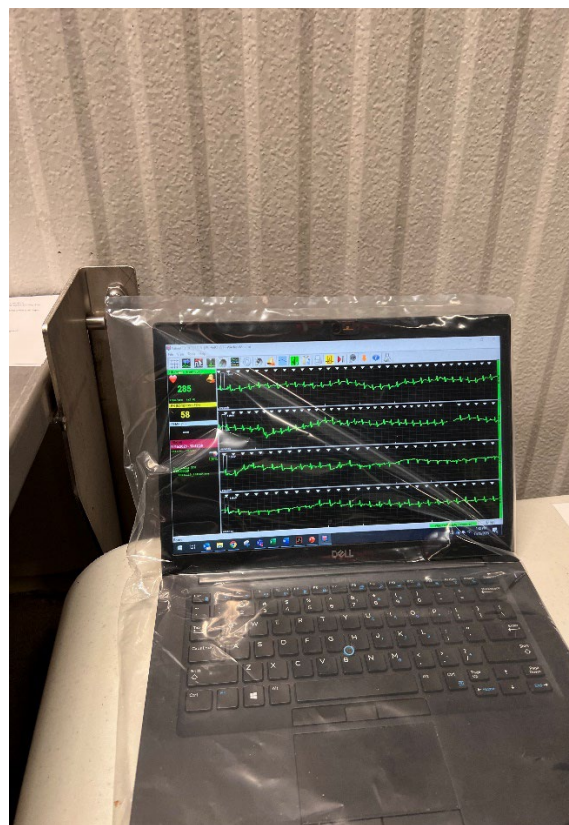
¹⁶ <https://poultryhealth.ca/>

The birds are irreversibly stunned but physiologically maintain heart activity and blood pressure consistent with and comparable to other approved forms of stunning (electrical low voltage, high amperage and low atmospheric pressure).

[...] In addition to the findings of this report, it is worth noting that any bird which was dead at the time of cutting would not have adequate blood pressure to bleed out and would be removed from the line as a DOA carcass (dark bird). We have no additional recommendation on improvements to be made to the trial or methodology.”



Live bird being tested.





DOA 1 being tested. Again, the bird is red and stiff.

Test 7: ECG Test

Location: Maple Leaf Foods, London ON

Date: May 15, 2024

1	78	Not Tested	1:20	ECG: Both legs and right wing
	74		1:40	
	91		2:01	
	110		2:15	
	90		2:30	
2	82	Not Tested	0:57	
	111		1:15	
	120		1:30	
	171		1:45	
	125		1:57	
	112		2:13	
	130	2:27		
3	108	Not Tested	0:50	
	72		1:03	
	89		1:17	
	103		1:31	
	190		1:51	
	114		2:20	
	272		2:34	
4	240	Not Tested	0:57	
	244		1:07	
	222		1:45	
	269		1:59	
	NR		2:23	
5	198	Not Tested	0:56	
	102		1:10	
	104		1:20	
	105		1:35	
	77		1:45	
	57		1:58	
	61		2:23	
	258		2:24	
6	113	Not Tested	0:40	
	113		0:57	
	107		1:07	
	105		1:20	
	103		1:39	
	106		1:56	
	113		2:08	
	103		2:20	
	112		2:29	
7	141	Not Tested	0:52	
	118		1:11	
	88		1:32	
	84		1:44	
	89		2:01	
	158		2:28	
8	100	Not Tested	0:47	
	102		1:00	
	127		1:12	
	300		1:35	
	292		1:52	
	200		2:07	
	187		2:18	
	136		2:31	
9	200		Not Tested	0:56
	198	1:08		
	134	1:18		
	130	1:36		
	282	1:48		
	228	1:11		
	124	2:26		
10	244	Not Tested	0:54	
	210		1:18	
	196		1:33	
	166		1:50	
	161		2:01	
	134		2:17	
	132		2:28	

11	171	Not Tested	0:35
	210		1:00
	240		1:11
	226		1:20
	180		2:36
	201		1:58
	170		2:13
	181		2:29
12	230	Not Tested	0:55
	160		1:24
	132		1:43
	150		1:57
	103		2:10
	112		2:21
	112		2:21
13	193	Not Tested	0:47
	187		1:02
	104		1:12
	205		1:20
	51		1:35
	38		1:46
	72	1:58	
14	192	Not Tested	0:47
	214		1:06
	158		1:17
	126		1:28
	127		1:38
	113		1:55
	105		2:14
	134		2:23
	94		2:30
15	122	Not Tested	0:44
	201		0:56
	244		1:20
	216		1:40
	176		1:59
	181		2:11
	134		2:22
	134		2:30
16	129	Not Tested	0:49
	106		1:08
	51		1:33
	87		1:41
	88		1:55
	110		2:02
	201		2:16
	175		2:25
	328		2:36
17	104	Not Tested	0:55
	72		1:11
	41		1:21
	75		1:30
	94		1:44
	87		1:55
	98		2:06
	129		2:22
	82		2:31
	82		2:31
18	134	Not Tested	0:51
	134		1:04
	203		1:27
	206		1:43
	228		1:54
	230		1:29
	230		2:21
	237		2:31
19	84	Not Tested	1:05
	78		1:16
	77		1:23
	80		1:33
	90		1:56
	192		2:08
	289		2:22
	198		2:31
20	141	Not Tested	0:43
	196		0:58
	98		1:09
	103		1:26
	206		1:36
	201		1:57
	187		2:13
	196		2:29

Since there were a total of seven birds that did not have a regular heart rate observable by electrocardiography out of all the ECG tests that were conducted prior and Dr. Kathleen Long had recommended to test with different lead connectors, such as alligator clips to improve the reliability of the ECG collection, the HMA decided to act upon this recommendation and conducted this test. The objective was to observe whether there would be improved ECG readings in the test birds or not, and to determine whether the birds that failed to display a regular heartbeat in previous tests was due to the weakness of the lead connectors or truly because there was a cessation of a heartbeat within them.

Hence, in the presence of two HMA representatives, Dr. Kathleen Long conducted ECG tests on 20 birds using the same PC-VetChek wireless ECG monitor as before however, instead of using low-force electrode clips as in all the tests prior, alligator electrode clips were used on this occasion as per her recommendation in her report dated December 10, 2023.

The stunner was set at 61% upon exit while the line speed was set at 250 chickens per minute. This made the distance between the first hanger and the last slaughterer an average of 1:15 minutes. The bird size was an average of 2.3 kg.

All 20 test birds not only showed a regular heart rate observable by electrocardiography but far stronger readings than in previous tests as can be observed in the recorded results above. This led us to conclude that the birds that failed to show a regular heart rate in the tests prior was due to the weakness of the low force electrode clips and not due to its heartbeat being absent because of mortality, especially when the same birds had readings on the CM560D-VET pulse oximeter that was used on them.

Conclusion

The series of tests that have been conducted thus far clearly show that CAS birds are not dead at the time of slaughter. Their body temperature, flaccidity, the amount of blood they drain and the way they drain, the constant readings of their ECG's and pulse all give us the assurance that the criterion of the birds being alive at the time of slaughter is being met without compromise. No shariah guideline is being violated thus resulting in the deliberate or inadvertent labelling of a non-halal bird as halal. As a result, the HMA has accepted the use of CAS for halal poultry slaughter provided it is regulated and meets all the criterion set forth by the organization.

Although the East has generally dismissed the permissibility of CAS for halal slaughter, countries that face similar challenges as Canada can benefit from this ongoing study and thus bring ease to their communities by making more halal chicken available for their markets. As the testing continues in the future, the HMA will make results publicly available and will be willing to assist any organization that requires CAS to become shariah complaint.

It should be noted and emphasized that the HMA does not accept CAS in an unrestricted manner. It only allows it when all its set guidelines are met. To date, the HMA has been engaged with four CAS operations and has only accepted two. A full-time HMA inspector is onsite daily for the entire operation to ensure continued compliance with all HMA guidelines. Birds that are unfit to qualify as halal are removed by the inspector from the line without company interference. Hangers are also trained at both facilities on halal guidelines and on how to identify dead birds. This enables them to remove dead birds post CAS with efficiency.

With Halal SOPs developed for both facilities, every safeguard and measure has been taken to ensure that the integrity of halal is always maintained.



Birds removed from the line by the HMA Inspector



Poultry Health Services

April 19, 2024

Comments on review of Maple Leaf Chicken Heart Rate Assessment of Chickens Stunned Using Controlled Atmosphere Stunning at London Poultry and Edmonton Poultry Facilities.

The reports detail an approach to measuring heart rate in chickens exposed to controlled atmosphere stunning, using ECG measurements, at two different poultry processing facilities in Canada. Cardiac activity (heartbeat) was observed in the vast majority of examined birds. Field observations using equipment built for a clinic environment do not deliver perfect results in a processing plant, and in this case a few of the birds did not have measurable ECG signals that would indicate a heartbeat. However, this does not mean that a heartbeat was not present; it could simply indicate a poor connection of those particular ECG leads and/or movement artifact in the measured birds. We have seen this challenge of intermittently disconnected leads and or readings in all of our euthanasia and stunning work, which can only be overcome with surgical implantation of the sensors and leads. Processing plants are not a clinic or laboratory setting and as such they will never have ideal measurements when compared to clinical setting which is important to note when evaluating this work. In our research program and plant monitoring work we have also seen the full array of pre-existing cardiac conditions in the birds we have evaluated for electrical, CO₂ and LAP stunning. While monitoring any given population of processing aged birds we see cardiac pathology, abnormalities and events which are extraneous to and unrelated to the stunning processes but none the less lead to variable outcomes including on occasion heart attacks immediately prior to or during stunning. This report and raw data sets, show the normal variations of cardiac function we would expect to see in meat bird populations. We would be suspicious of measurements which did not show this variation.

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Poultry Health Services

Furthermore, the bleed-out of these birds was normal, and the facilities achieve bleed-out successfully on a routine basis across large numbers of birds, which is a good indication of the irregular but present cardiac activity in CAS stunned birds. Post stunning (in all systems) and during the bleed out period, we have observed cardiac arrest periods and abnormal contraction patterns which do not all elicit measurable ECG results. When cardiac function has been interrupted or impacted by the CO2 stunning, blood flow rates and or blood pressure may be used as a proxy method of the actually cardiac activity. These reports demonstrate that heartbeats are routinely present in birds that have been exposed to controlled atmosphere stunning at these facilities, which is considered a sign of life. The birds are irreversibly stunned but physiologically maintain heart activity and blood pressure consistent with and comparable to other approved forms of stunning (electrical low voltage, high amperage and low atmospheric pressure). It should be noted that even with high voltage, low amperage stunning which induce cardiac arrest, the birds are considered, insensible but alive at the time of bleeding. Unlike the event of simultaneous cardiac and brain interruption through electrical stunning, in CO2 stunning the brain activity will cease prior to the cardiac function. In addition to the findings of this report, it is worth noting that any bird which was dead at the time of cutting would not have adequate blood pressure to bleed out and would be removed from the line as a DOA carcass (dark bird). We have no additional recommendation on improvements to be made to the trial or methodology but would be available to discuss further upon request.

Sincerely,

Dr. Ben Schlegel

Dr. Tom Inglis

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Heart Rate Assessment of Chickens Stunned Using Controlled Atmosphere Stunning: London Poultry Study 2

Testing Date: May 14th, 2024

Report Date: June 4th, 2024

Prepared By: Dr. Kathleen E. Long, DVM, MAHM, Dipl. ACPV

Location: London Poultry, Maple Leaf Foods Inc., London, Ontario, Canada

Introduction

Background

Controlled atmosphere stunning is a method of pre-slaughter stunning that renders animals insensible through exposure to elevated concentrations of carbon dioxide gas (CO₂) or other gases. Multi-phase controlled atmosphere stunning uses a gradient of increasing gas concentrations to prevent or minimize aversive conditions prior to the loss of sensibility (Figure 1). In multi-phase CO₂ stunning, animals are first exposed to lower concentrations of CO₂ which causes acidification of the blood and brain cells, resulting in depression and loss of consciousness. Further increases in CO₂ concentration result in slowing of respiration and eventual cessation of breathing, leading to death (Terlouw, 2016, 2020). The heart simultaneously first increases in rate, followed by eventual slowing and cessation (Terlouw, 2016, 2020). Few published studies are available that report duration of heart activity following CO₂ stunning; however, Portillo (2019) found no significant differences in the time to cessation of heartbeat between electrical waterbath stunning, controlled atmosphere stunning with or without oxygen, and unstunned birds. Furthermore, the heartbeat persisted for more than 10 minutes for all treatments (Portillo, 2019).

This experiment was conducted to assess the heart rates of stunned chickens by electrocardiography using alligator-style electrode clips in place of low-force electrode clips. Prior electrocardiography assessments were completed using low-force electrode clips (Long, 2023a, 2023b).

Methods of Heart Rate Determination

Electrocardiography (ECG) is a measure of the electrical activity of the heart, recorded from the surface of the body using electrodes (Carr, 2012). ECGs are used to accurately determine heart rhythm and assess for conduction abnormalities (Carr, 2012). The depolarizing forces of the heart generate an observable wave form which can be used to determine heart rate and rhythm, and for additional cardiac diagnostic purposes when standardized lead and patient positioning are used (Carr, 2012).

Trial Objectives

The first objective of this experiment was to validate an amended protocol for use of the PC-VetChek™ wireless ECG monitor (Vmed Technology Inc., Mill Creek, Washington, USA) for electrocardiography of insensible broiler chickens, whereby metal alligator electrode clips were used in place of low-force electrode clips.

The second objective of this experiment was to measure the heart rate of insensible chickens following controlled atmosphere stunning to demonstrate the presence of a regular heartbeat using electrocardiography to further substantiate results of prior experiments (Long, 2023a, 2023b).

Materials & Methods

Animals

All experimental procedures were approved and overseen by a veterinarian and animal welfare-trained company personnel. A total of 20 mixed-sex Ross 708 broiler chickens were assessed at the time of processing. All birds were insensible at the time of ECG collection.

Birds were sourced from commercial broiler chicken farms in Ontario, Canada and were fed a conventional “grain-fed” broiler ration (Canadian Food Inspection Agency, 2022). Birds used in this experiment were obtained from a single farm and had average live bird weights of 2.31 to 2.34 kg per transportation load.

Experimental Design

ECG readings were obtained from 20 insensible birds which had been stunned. Each bird was assessed individually immediately after stunning.

Stunning Equipment

Birds were rendered insensible using CO₂ gas in a commercial Maxiload Twin multi-stage controlled atmosphere stunning system (Meyn Food Processing Technology B.V., Amsterdam, The Netherlands). The maximum CO₂ concentration is 66%, and the measured CO₂ concentration during the trial was 62% on the exit side of the stunner. Birds become fully insensible during the exit phase of stunning. The longest shackle time duration was 1 minute, 23 seconds measured from the first hanging position to the last slaughter position.

Electrocardiogram Reading Collection

Insensible birds were collected individually for ECG testing upon exiting the stunner, immediately after the drawer passed the stunner exit guard. Only birds free of abnormalities or visually observable weight extremes were selected for ECG testing. All stunned birds were insensible when ECG readings were collected. ECGs were recorded from approximately one minute after the bird was collected until two minutes and 30 seconds after the bird was collected. The one-minute time lapse to the start of ECG recording represented the time required to retrieve the bird at the stunner exit and connect

the ECG leads. Insensible birds were placed in dorsal recumbency to facilitate lead connection and because the ECG readings were not intended for wave-form diagnostic purposes.

ECGs were collected using a three-lead PC-VetChek™ wireless ECG monitor and Vmed PC-Display v2.6.0 viewing software (Vmed Technology Inc., Mill Creek, Washington, USA). Manufacturer-supplied low-force electrode clips were replaced with metal alligator electrical clips sourced from a home supply store by mounting them on the existing leads (Figure 2). Leads were clipped to the skin of the right proximal humerus, and to the skin of each inguinal fold proximal to the left and right femurs. Alligator clips were only used on stunned birds that were insensible to pain. Variability in lead positioning on each limb was attributable to locating sufficient loose skin to attach each clip. Large feathers were removed, and 70% isopropyl alcohol was applied to the skin at each lead connection to enhance electrode conductivity.

The heart rate of each stunned bird was documented at 30-second intervals from the time the leads were connected until two minutes and 30 seconds after collection of the bird using the real-time heart rate displayed on the Vmed PC-Display (Vmed Technology Inc., Mill Creek, Washington, USA). If no heart rate was displayed on the screen, it was recorded as zero.

Electrocardiogram Analysis

ECG recordings were viewed using ECG Reviewer v2.26.0 software (Vmed Technology Inc., Mill Creek, Washington, USA). A 12-second sample of each recording with a sweep rate of 50 mm per second was printed into a PDF report (Appendix 1). The gain was increased to 20 mm/mV to enable pulse observation. Samples were selected to

demonstrate a regular heart rate with minimal artifact, and the highest regular discernible heart rate from the recording was selected. The heart rate from each sample was determined by counting the discernible waveforms and multiplying by five to obtain a heart rate in beats per minute (bpm).

Results

Heart rates from insensible, stunned birds were 90 to 290 bpm based on the ECG monitoring report samples, and all birds had an observable rhythmic heartbeat (Table 1; Figure 3). Heart rates documented in real time from the ECG display were variable. One bird did not have a reading at one minute post stunning due to electrode positioning, and another bird did not have a reliable reading at one minute post stunning due to movement artifact (Table 1).

Discussion

Presence of Heartbeat

Presence of a consistent heartbeat was observed in all 20 stunned birds evaluated in this experiment. In comparison, a heart rate could not be detected in five out of 30 birds and one out of 22 birds in prior experiments (Long, 2023a, 2023b). This trial specifically evaluated the use of alligator electrode clips instead of low-force electrode clips to determine whether enhanced electrode contact increases the likelihood of obtaining a heartrate measurement. Positioning of the electrode clips was also moved to the inguinal area and a larger area of skin clipped with the alligator clips. It cannot be determined with certainty whether the improved heartbeat detection in this study was attributable to the electrode clip type, lead positioning, or some other factor. However, this work suggests

that alligator clips and inguinal positioning of electrodes may be beneficial when conducting ECG measurements of chickens.

Heart Rate

Heart rates observed using the ECG monitoring reports were variable and changed throughout the monitoring period for each bird, which is consistent with results of previous trials (Long, 2023a, 2023b). Variation in the heart rate is normal following controlled atmosphere stunning, and heart rates did not decline in a linear fashion after stunning. Observations in this trial and previous trials (Long, 2023a, 2023b) suggest that heart rates may be lower and more rhythmic immediately following stunning, and then increase as the bird approaches death. In all cases, the detection of a regular heart rate is a sign of life.

Conclusions

1. Twenty out of 20 birds had a regular heart rate observable by electrocardiography, which is considered a sign of life.
2. Alligator lead clips and inguinal electrode positioning may improve the likelihood of successfully obtaining ECG readings from stunned chickens and should be incorporated into future experimental protocols.

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Tables and Figures

Table 1. Electrocardiography results. Heart rates from ECG samples were calculated using a 12-second sample from the ECG monitoring report from each bird (Appendix 1). Heart rate monitoring continued until 2 minutes and 30 seconds after stunning.

Bird Number	Stunned or Unstunned	Heart Rate from ECG Sample	Heart Rate from ECG Real-Time Display at Timed Intervals			
			1:00	1:30	2:00	2:30
1	Stunned	95	-	167	91	92
2	Stunned	155	108	121	126	126
3	Stunned	165	74	101	134	184
4	Stunned	240	235	-	-	-
5	Stunned	200	177	105	88	-
6	Stunned	115	108	110	104	112
7	Stunned	140	138	106	89	127
8	Stunned	235	102	244	186	136
9	Stunned	200	198	136	263	187
10	Stunned	235	242	195	161	117
11	Stunned	220	210	205	97	181
12	Stunned	185	175	137	121	121
13	Stunned	175	187	51	-	-
14	Stunned	185	208	125	77	94
15	Stunned	210	244	226	163	134
16	Stunned	290	Artifact	61	145	150
17	Stunned	90	113	75	86	82
18	Stunned	130	130	183	224	233
19	Stunned	90	41	80	109	198
20	Stunned	170	106	193	200	180

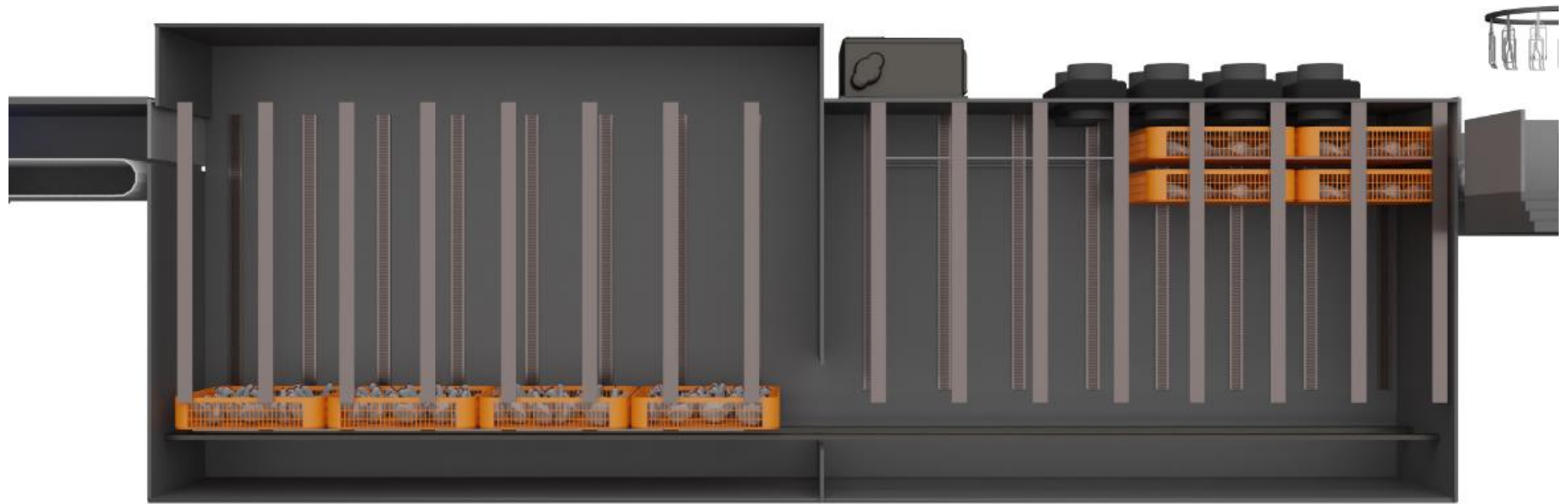


Figure 1. Graphic rendering of multi-phase controlled atmosphere stunning system. Groups of four drawers containing sensible birds enter into the upper left portion of the stunner and are gradually lowered through a gradient of increasing carbon dioxide concentrations, rendering the birds insensible. Drawers are conveyed to the right half of the stunner which contains a maximal concentration of carbon dioxide and are elevated in groups of two drawers and exit the stunner on the upper right side.

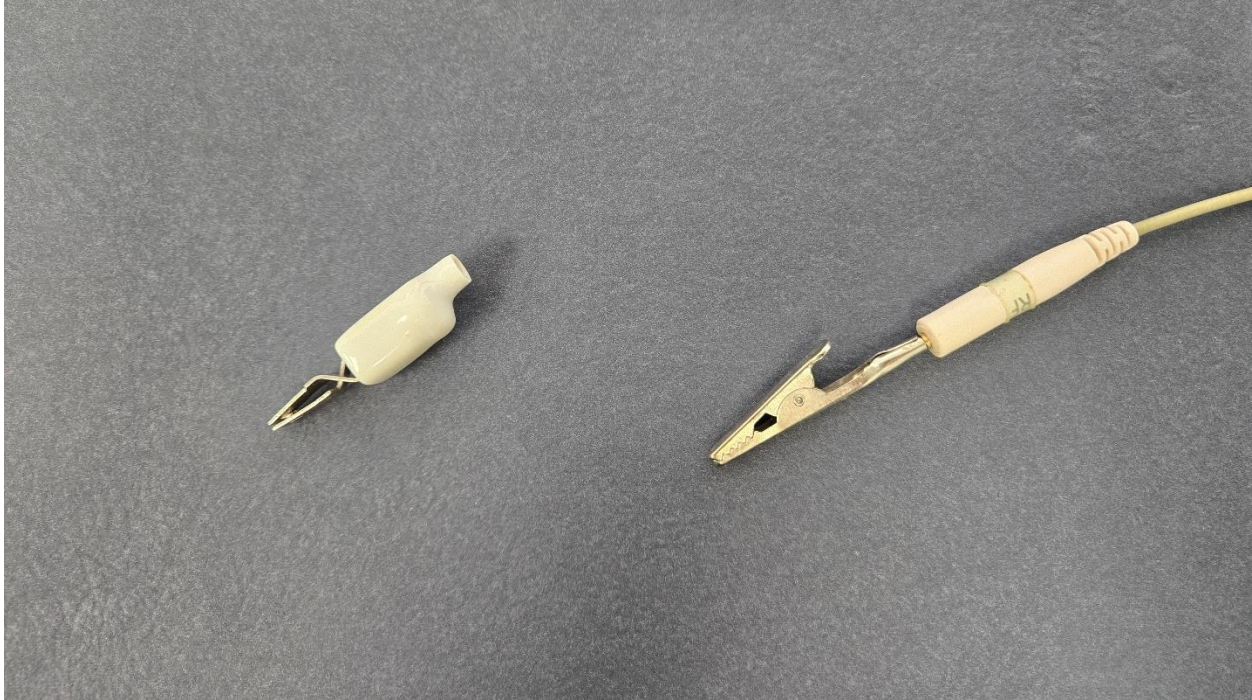


Figure 2. Left: Low-force ECG lead connection clip supplied by ECG manufacturer, as used in prior studies. Right: Metal alligator clip attached to ECG lead, as used in current study to promote improved conductivity. Alligator clips were only applied to stunned, insensible birds.

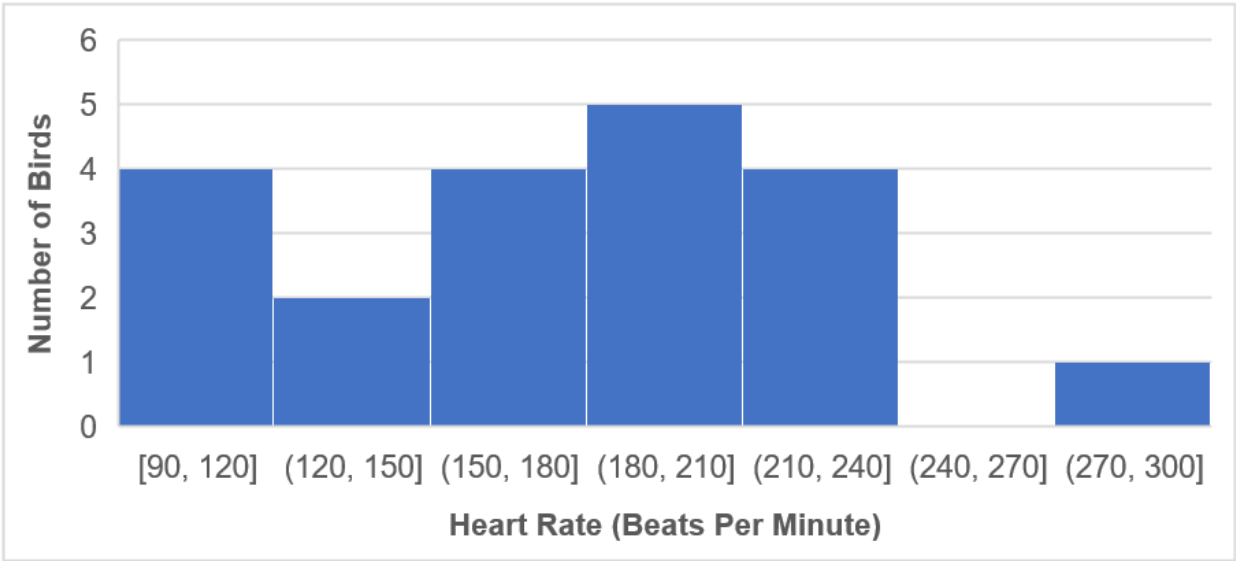


Figure 3. Distribution of heart rates of stunned birds, calculated from ECG monitoring reports using a 12-second sample (Appendix 1).

Appendix 1. ECG monitoring report for each bird sampled. Bird number is stated in the “Patient Name/ID” field. Each report shows a 12-second sample. The sweep rate is 50 mm/sec and the gain is 20 mm/mV.

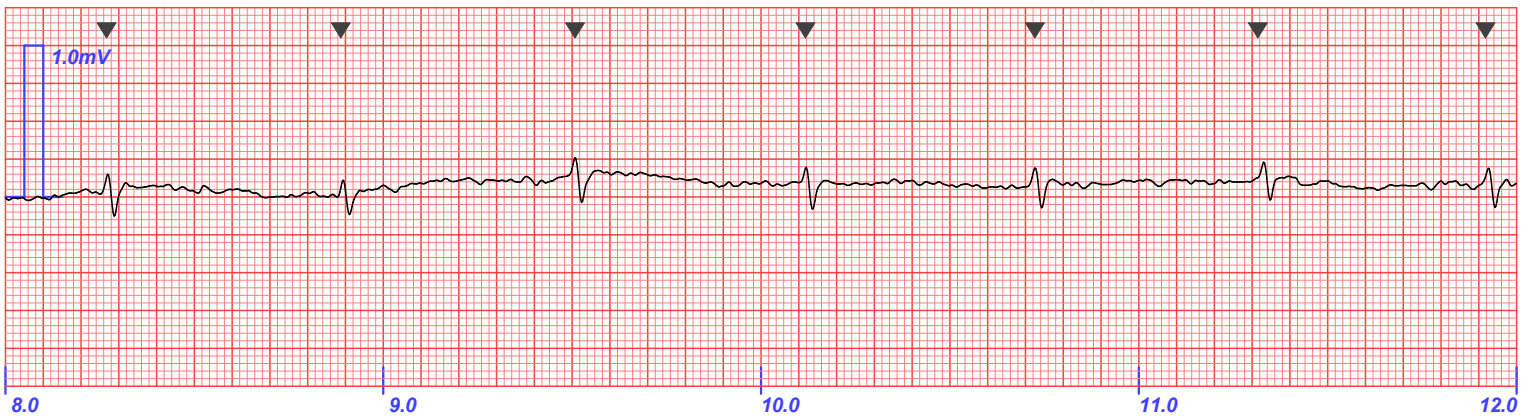
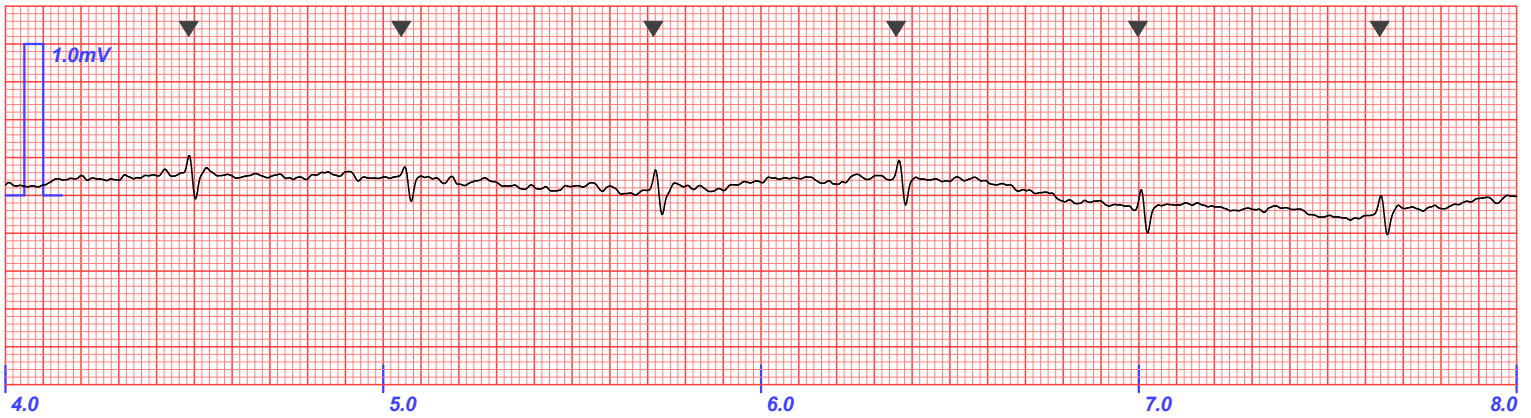
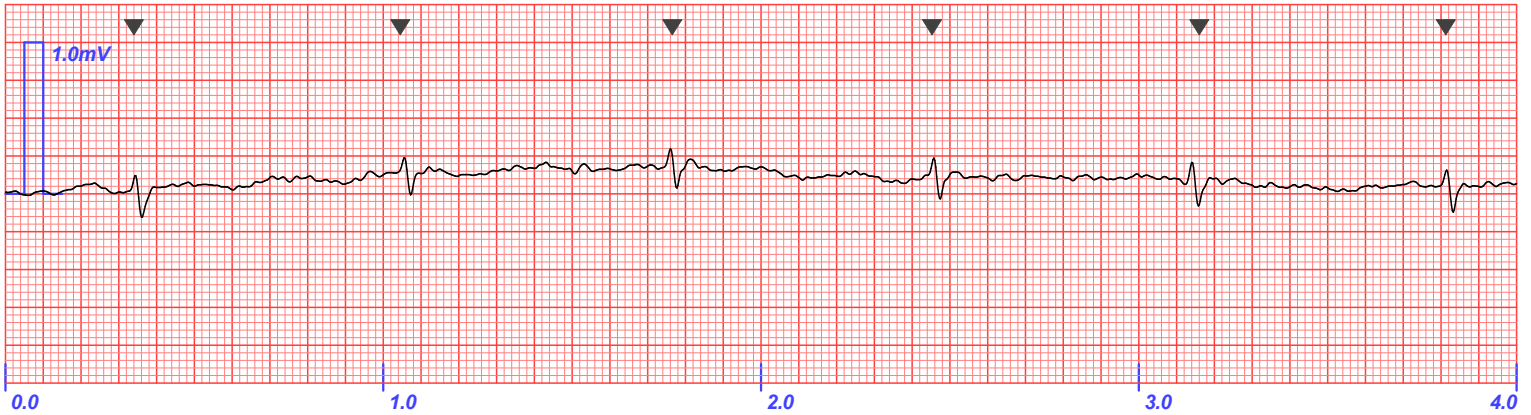


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 09:54:23
Elapsed Time: 00:02:23
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Episode Date / Time: 05/14/2024 09:52:00
Episode Duration: 00:03:20

Patient Name/ID: Bird 1
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2022
Sex: Unknown
Weight: 0 lbs



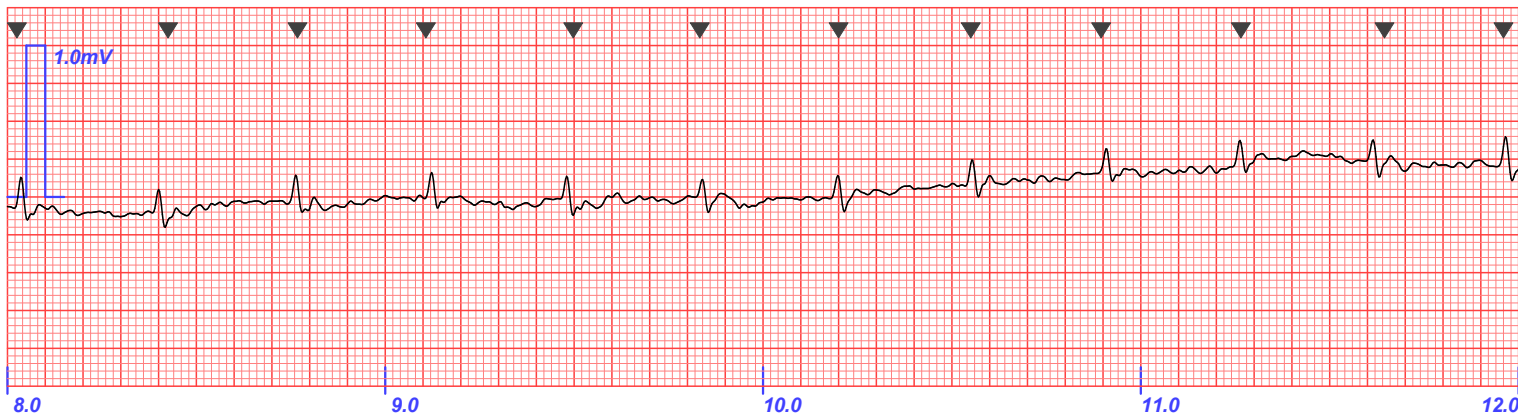
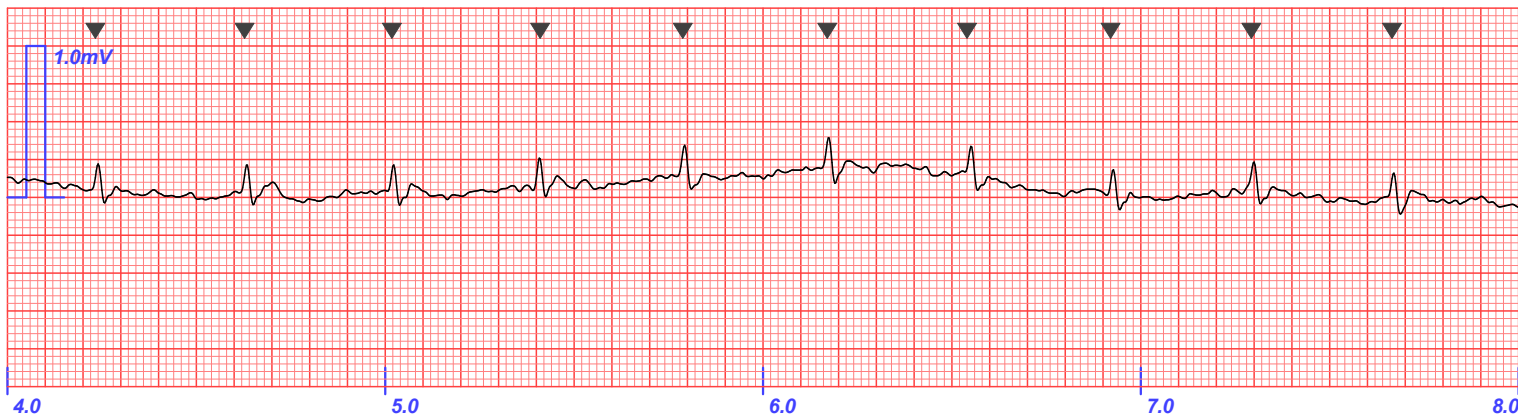
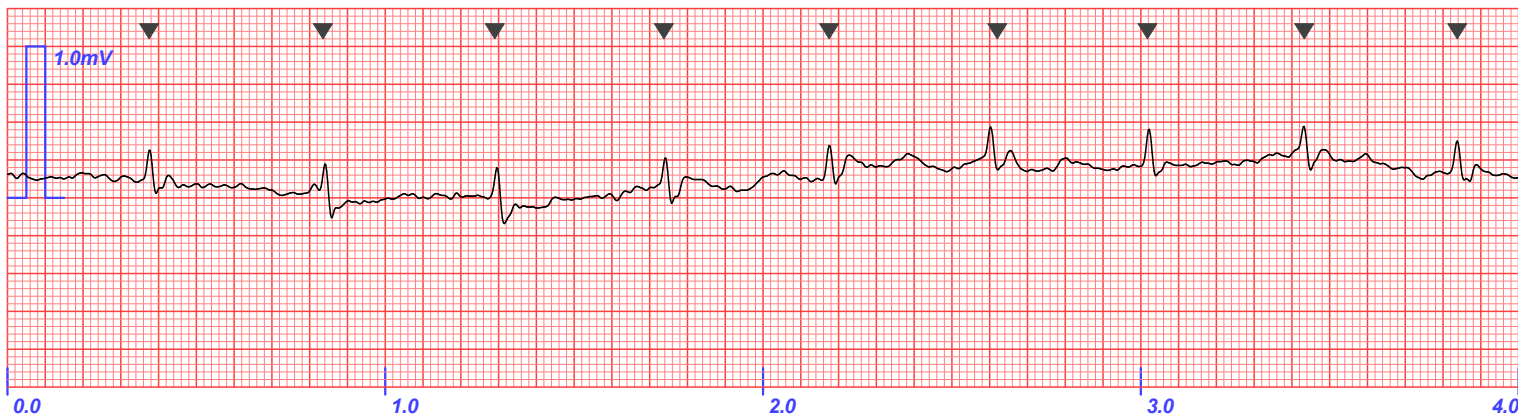


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 09:57:11
Elapsed Time: 00:01:46
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Episode Date / Time: 05/14/2024 09:55:25
Episode Duration: 00:02:59

Patient Name/ID: Bird 2
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2021
Sex: Unknown
Weight: 0 lbs



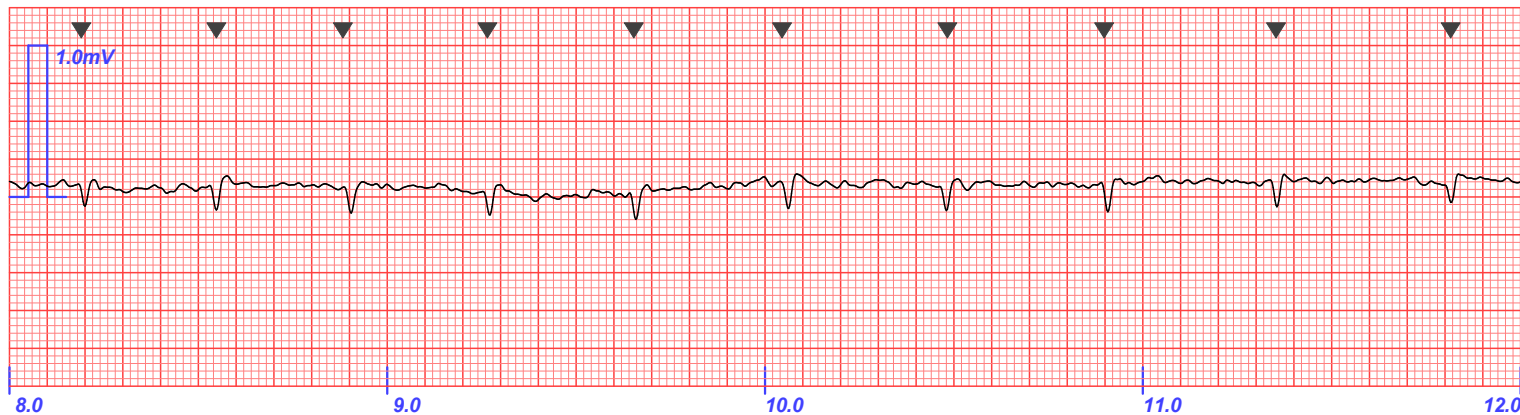
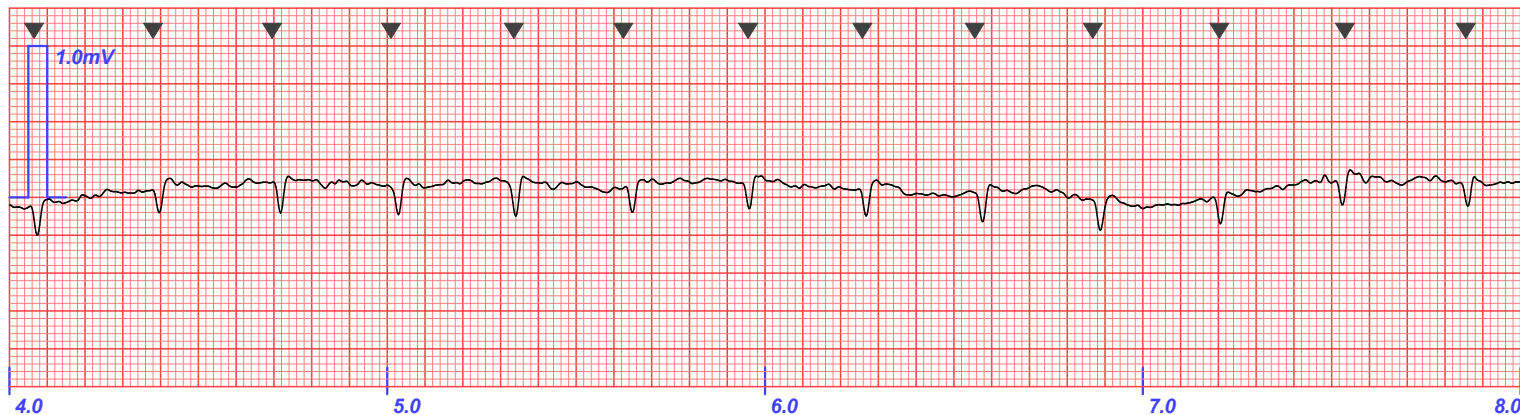
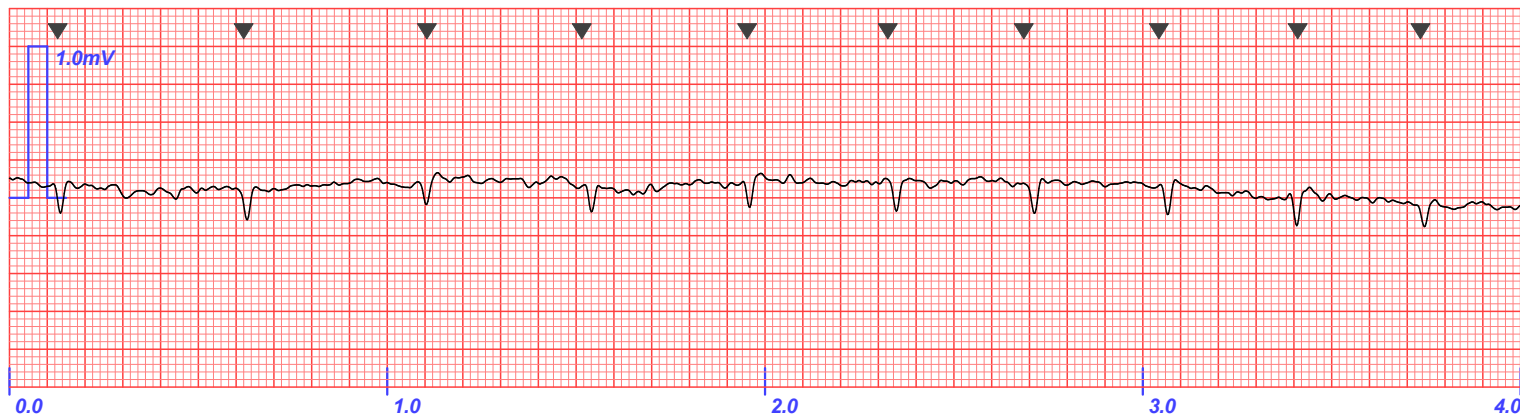


*Veterinary
Monitoring
Report*

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Elapsed Time: 00:01:57
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Patient Name/ID: Bird 3
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2020
Sex: Unknown
Weight: 0 lbs

Episode Date / Time: 05/14/2024 09:58:32
Episode Duration: 00:02:54



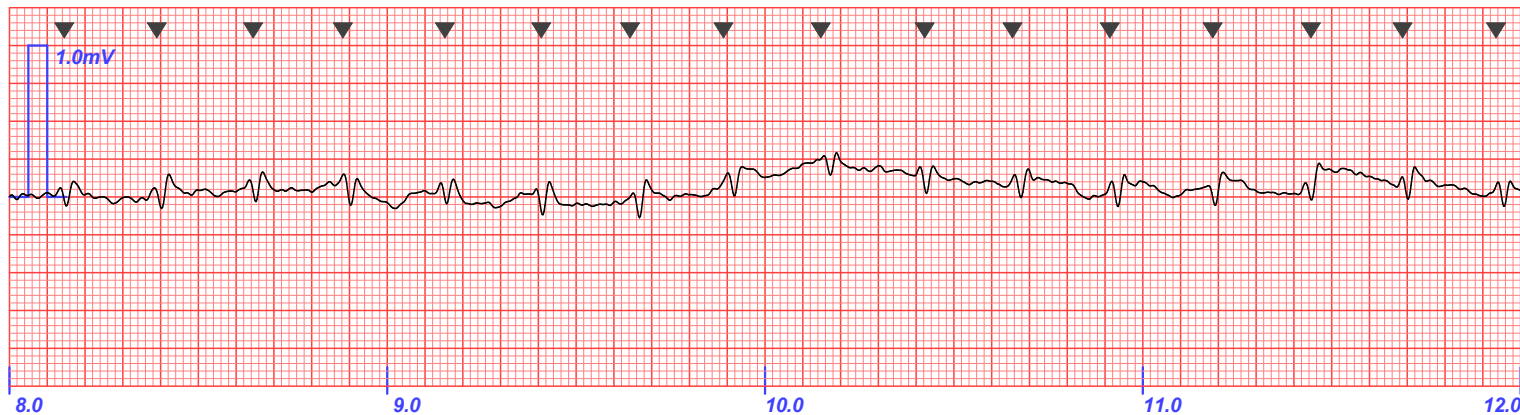
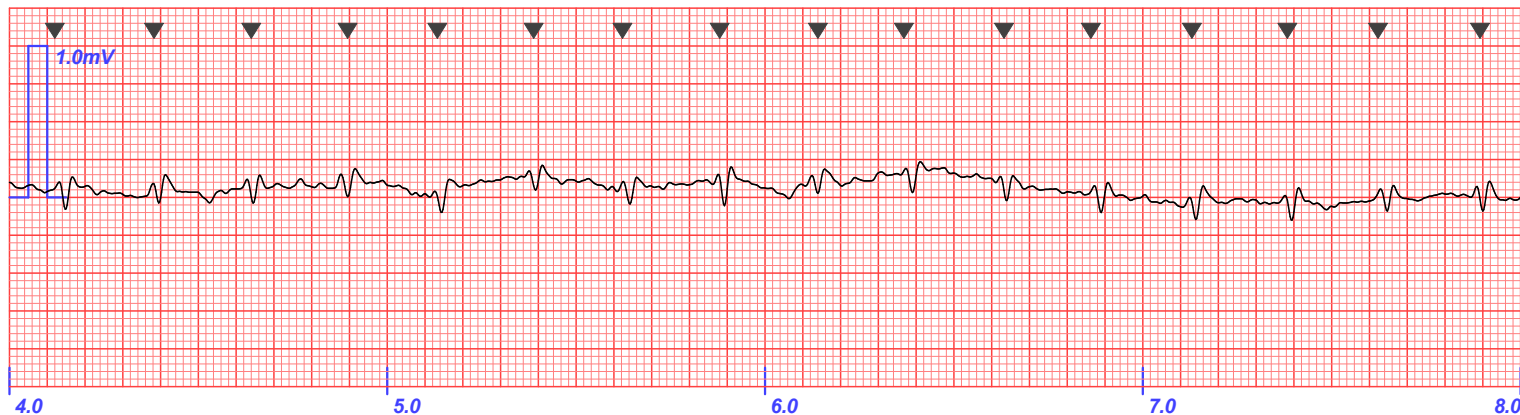
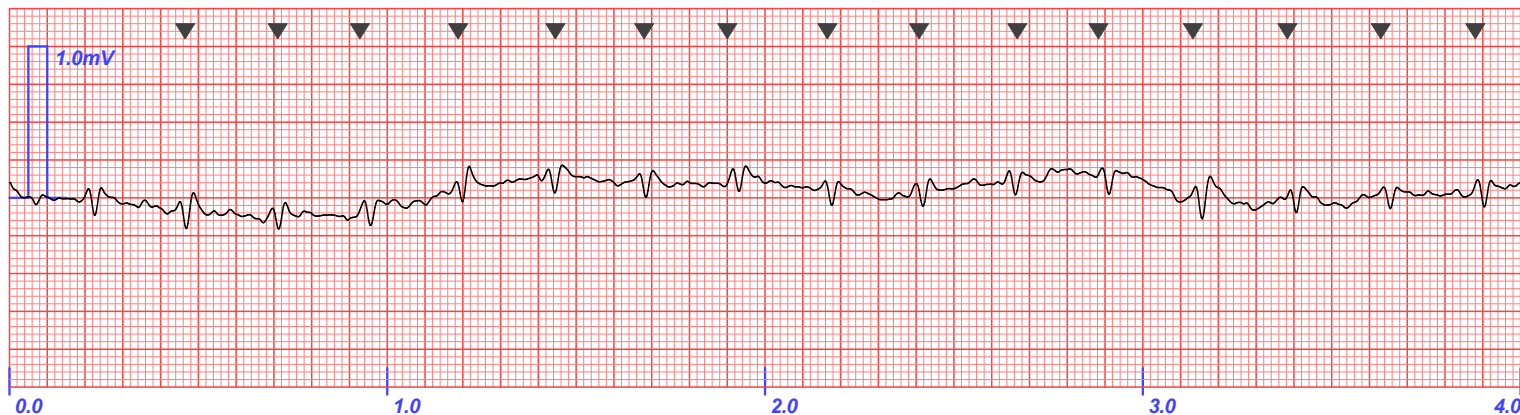


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:02:42
Elapsed Time: 00:01:11
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Episode Date / Time: 05/14/2024 10:01:31
Episode Duration: 00:03:12

Patient Name/ID: Bird 4
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2019
Sex: Unknown
Weight: 0 lbs

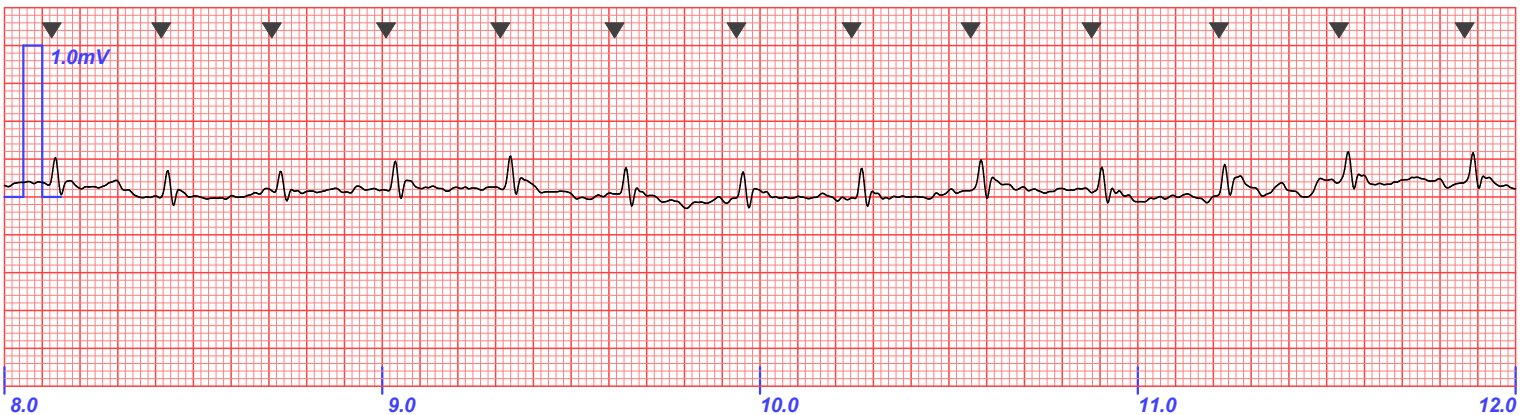
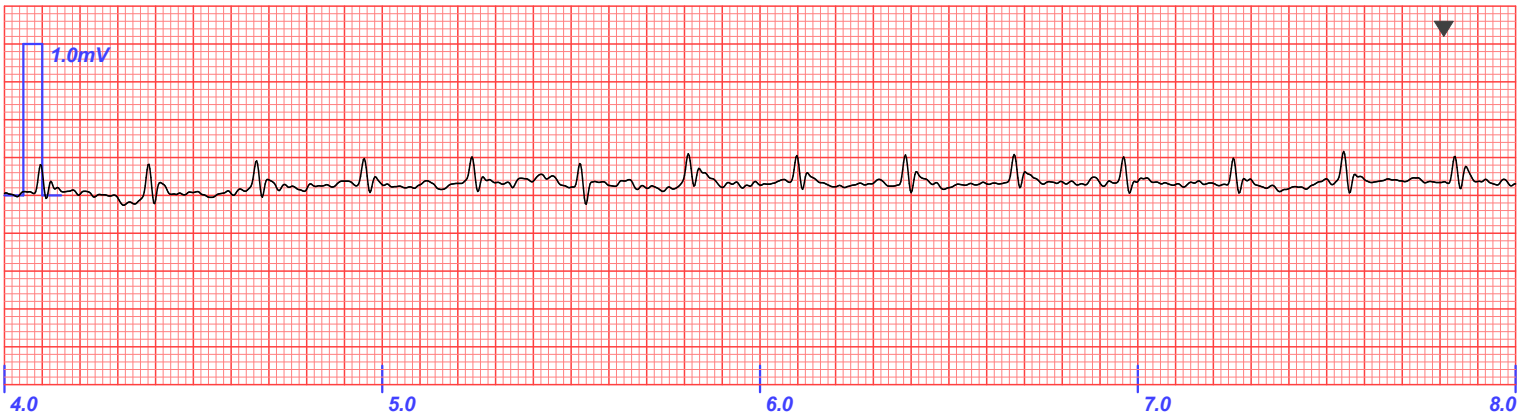
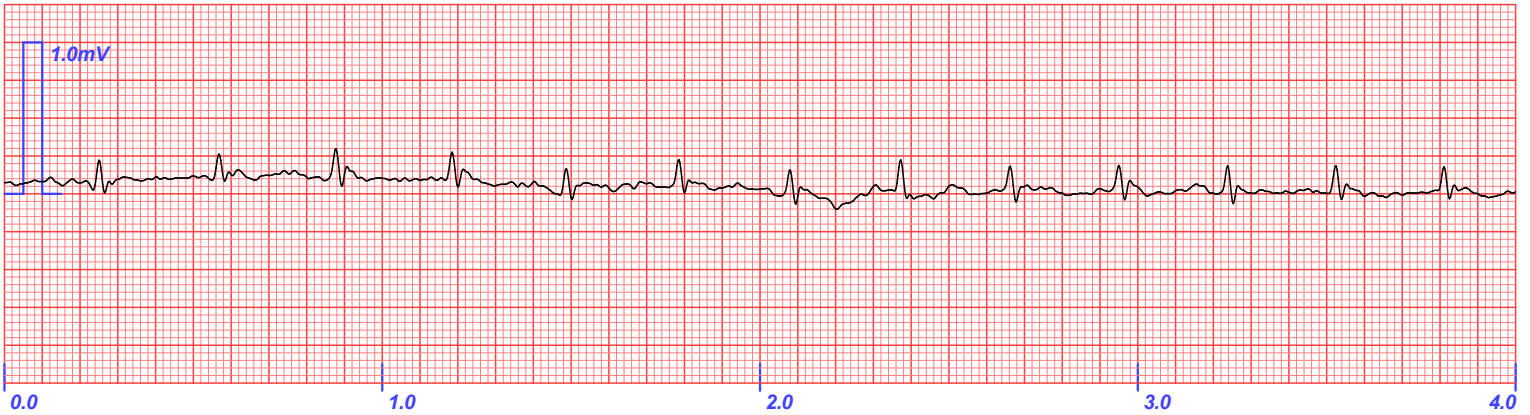




*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:05:49
Elapsed Time: 00:01:01
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz
Episode Date / Time: 05/14/2024 10:04:48
Episode Duration: 00:02:47

Patient Name/ID: Bird 5
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2018
Sex: Unknown
Weight: 0 lbs

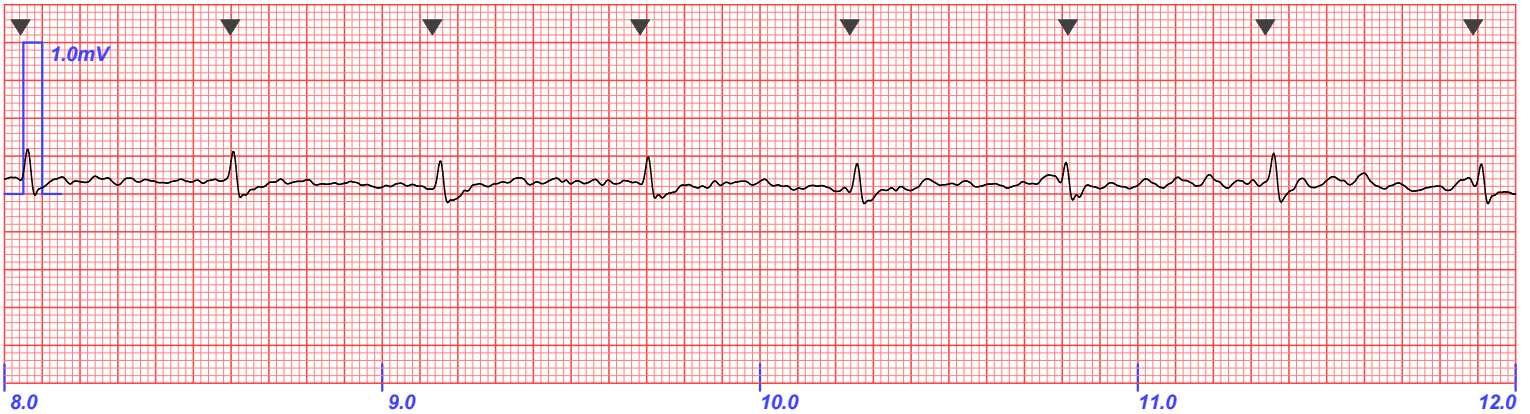
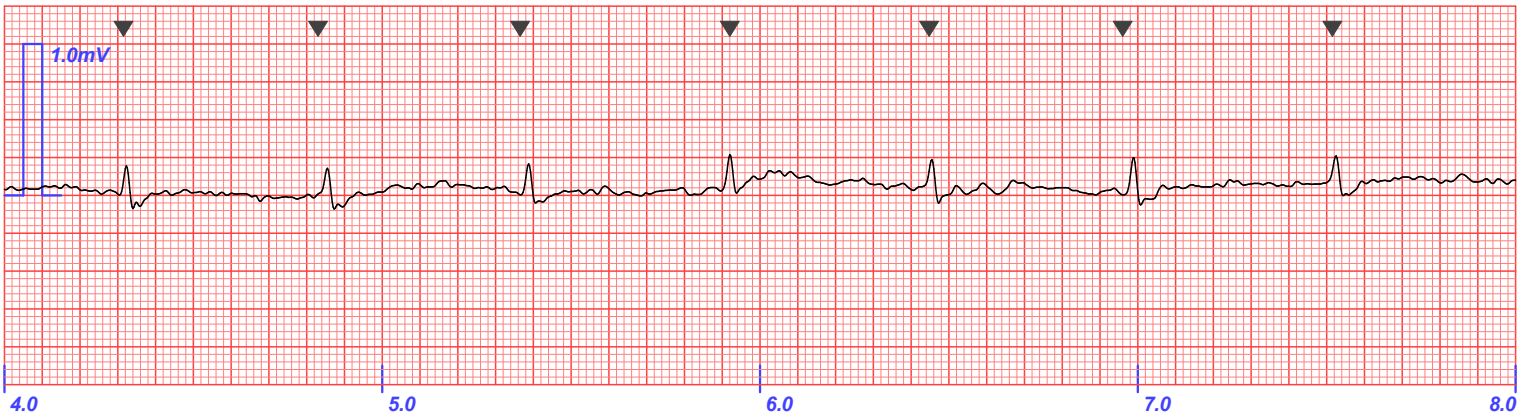
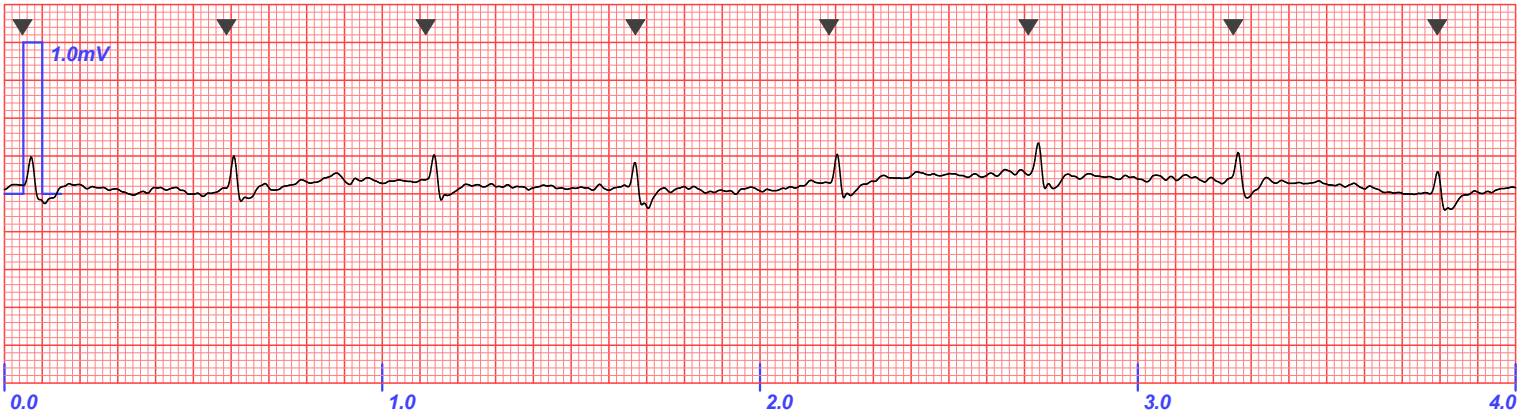




*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:08:42
Elapsed Time: 00:01:02
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz
Episode Date / Time: 05/14/2024 10:07:40
Episode Duration: 00:02:57

Patient Name/ID: Bird 6
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2017
Sex: Unknown
Weight: 0 lbs



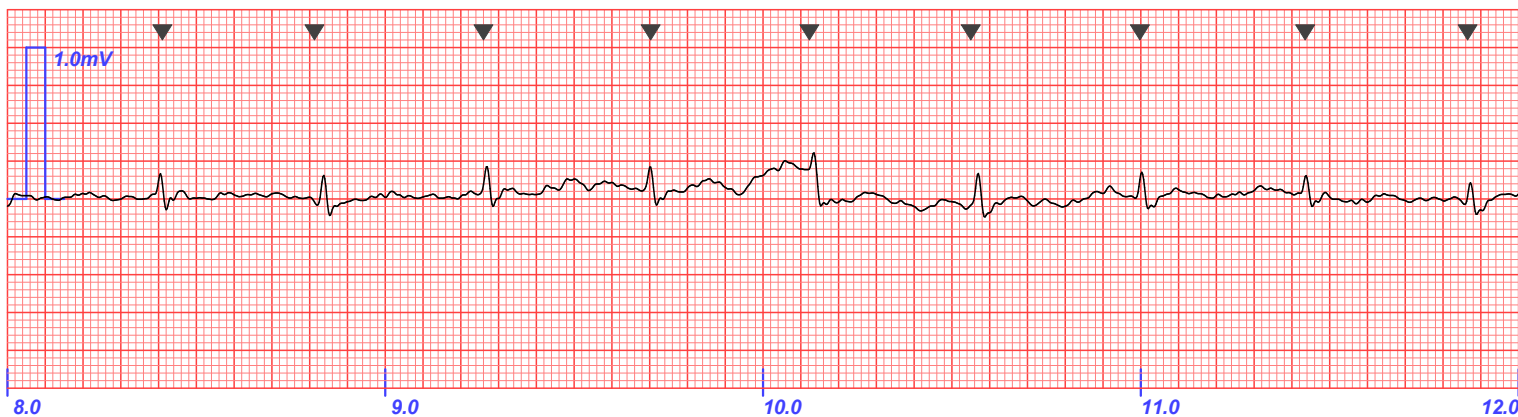
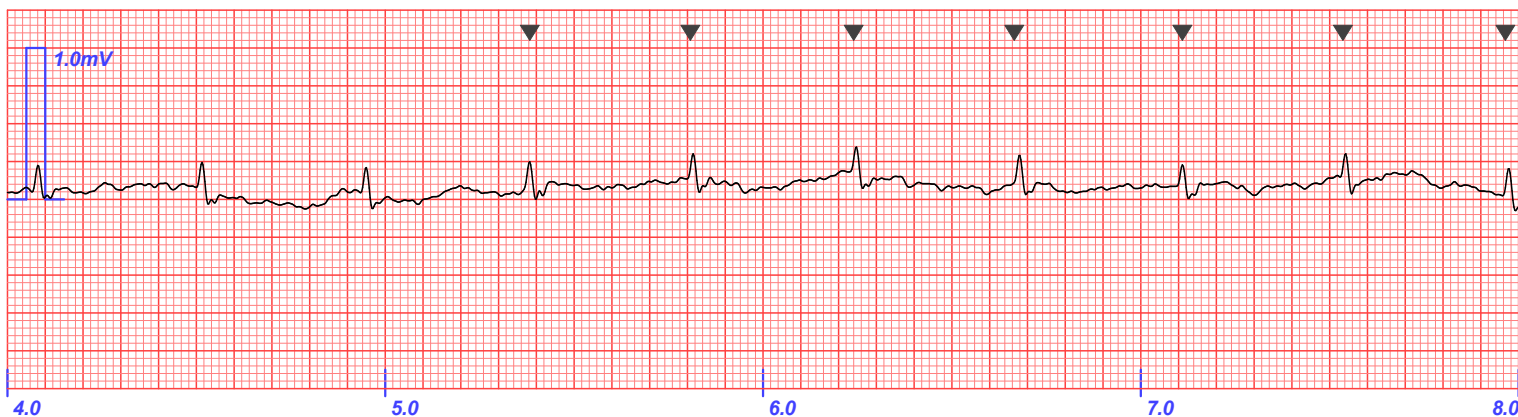
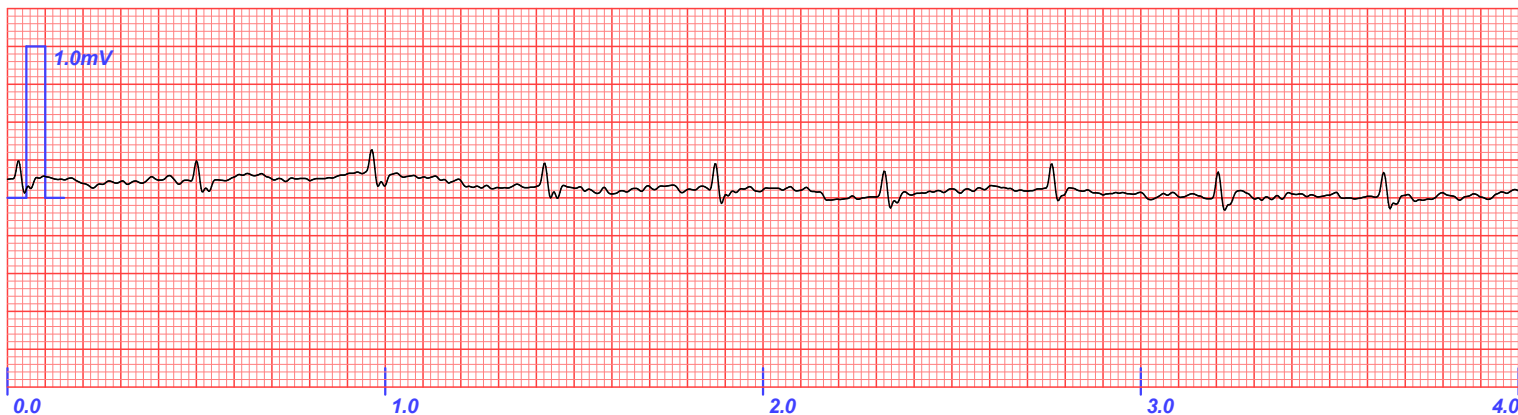


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:11:47
Elapsed Time: 00:01:03
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Episode Date / Time: 05/14/2024 10:10:44
Episode Duration: 00:03:08

Patient Name/ID: Bird 7
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2016
Sex: Unknown
Weight: 0 lbs



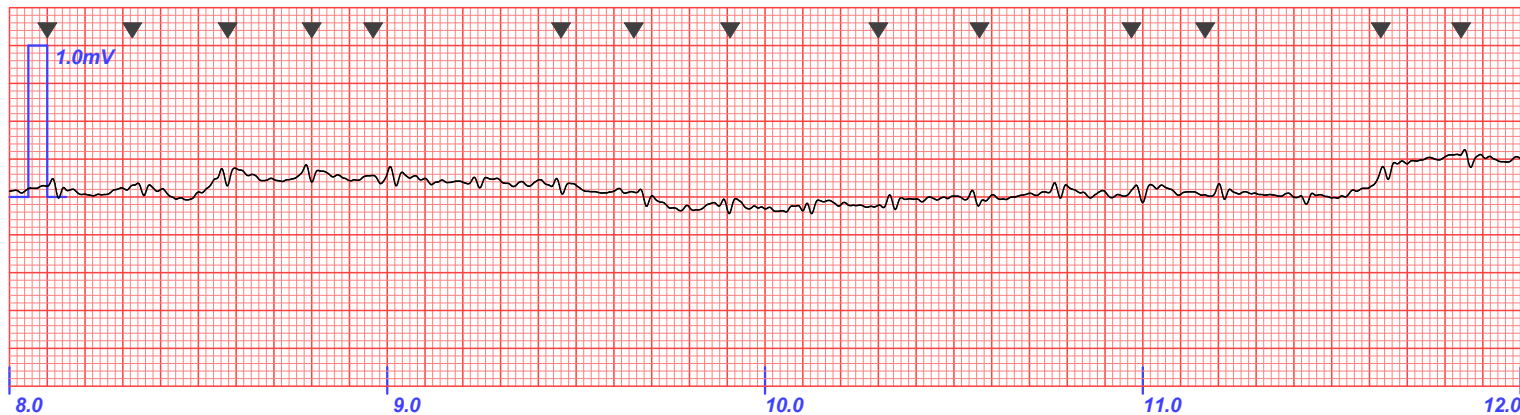
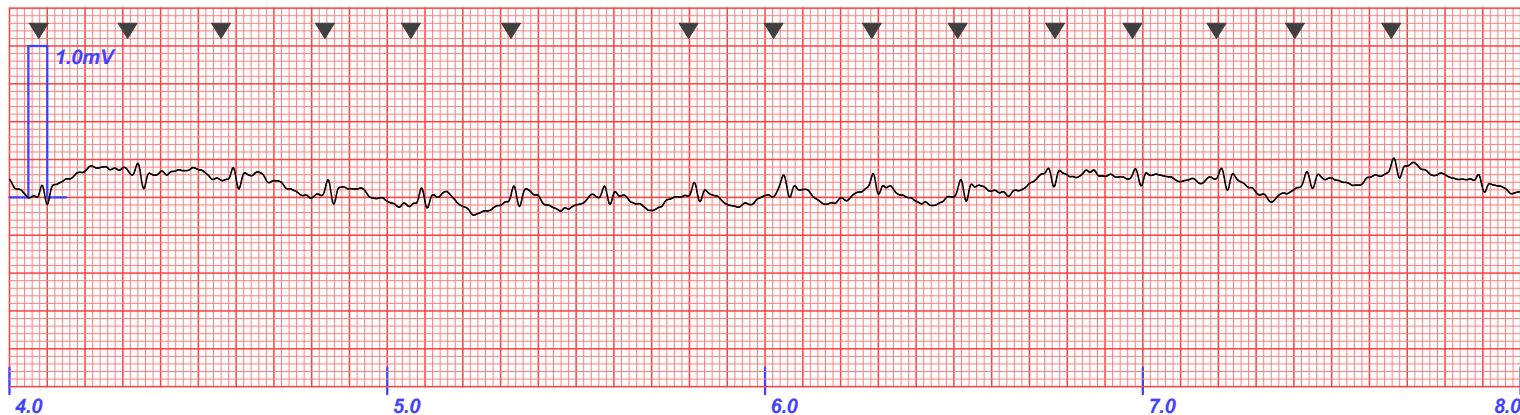
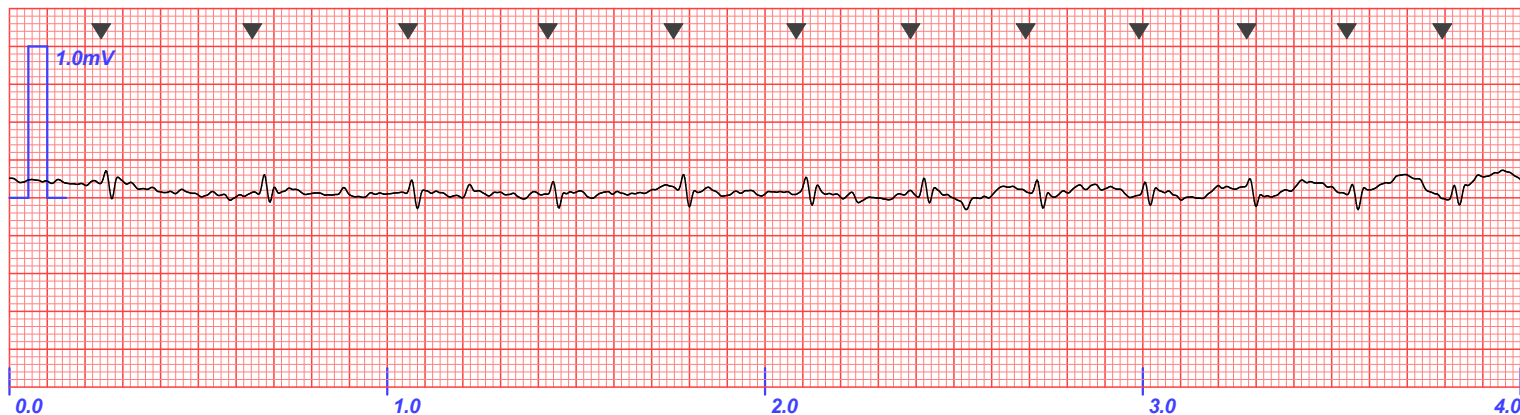


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:15:14
Elapsed Time: 00:01:14
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Episode Date / Time: 05/14/2024 10:14:00
Episode Duration: 00:02:51

Patient Name/ID: Bird 8
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2015
Sex: Unknown
Weight: 0 lbs



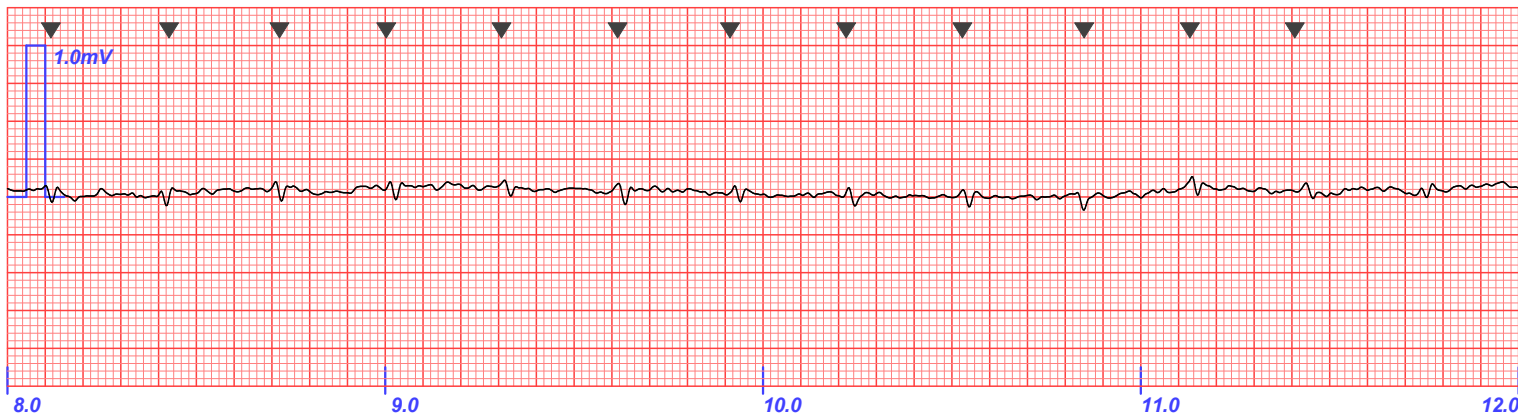
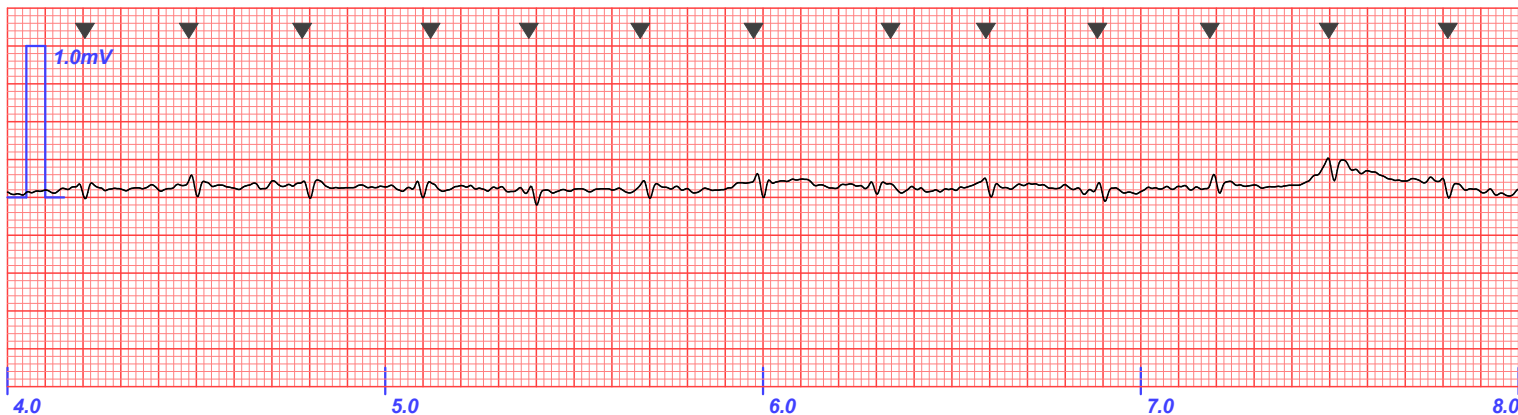
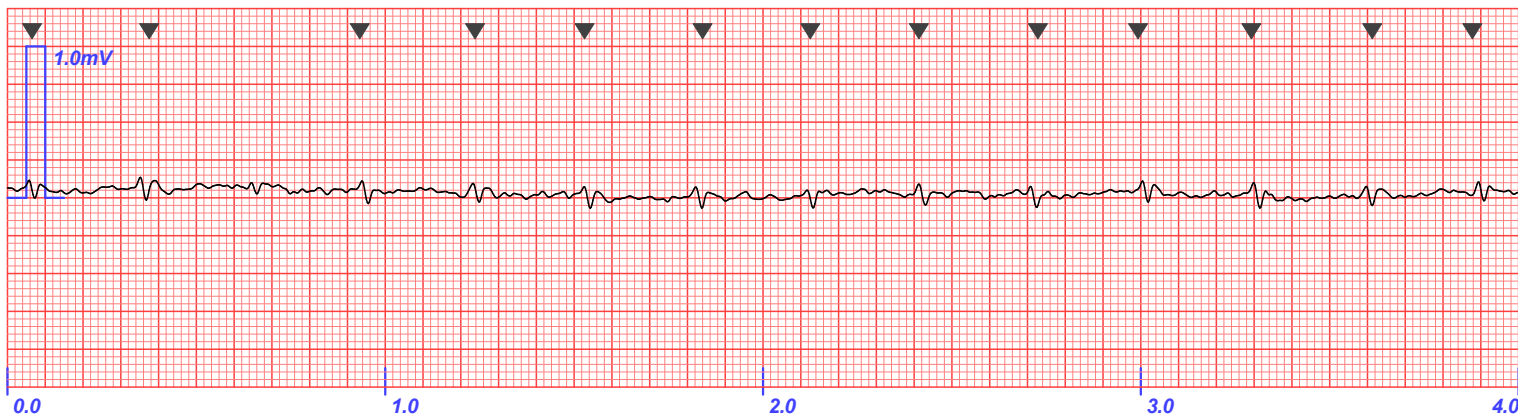


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:17:47
Elapsed Time: 00:00:48
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Episode Date / Time: 05/14/2024 10:16:59
Episode Duration: 00:02:40

Patient Name/ID: Bird 9
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2014
Sex: Unknown
Weight: 0 lbs



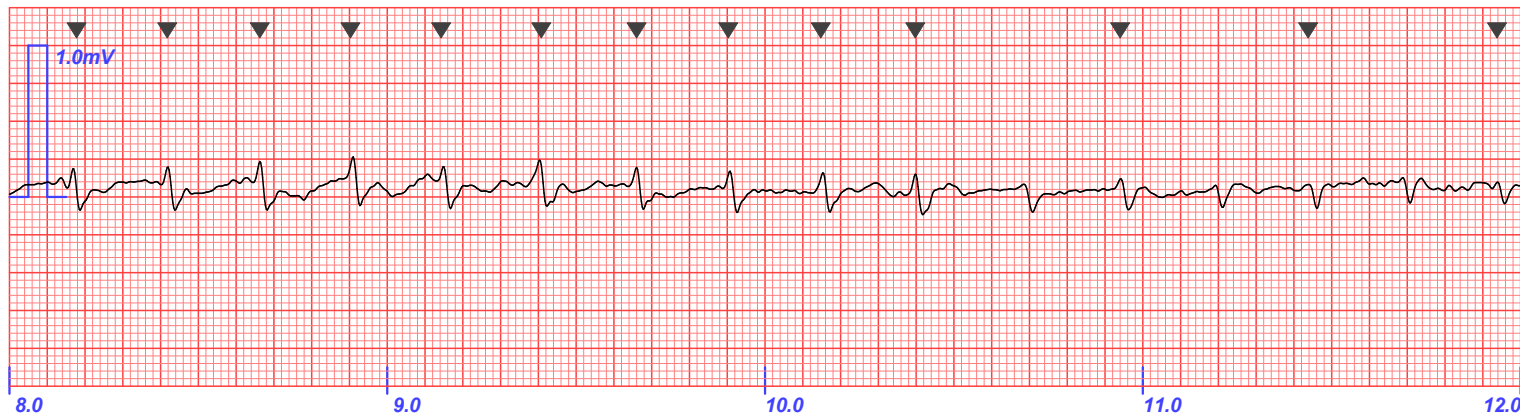
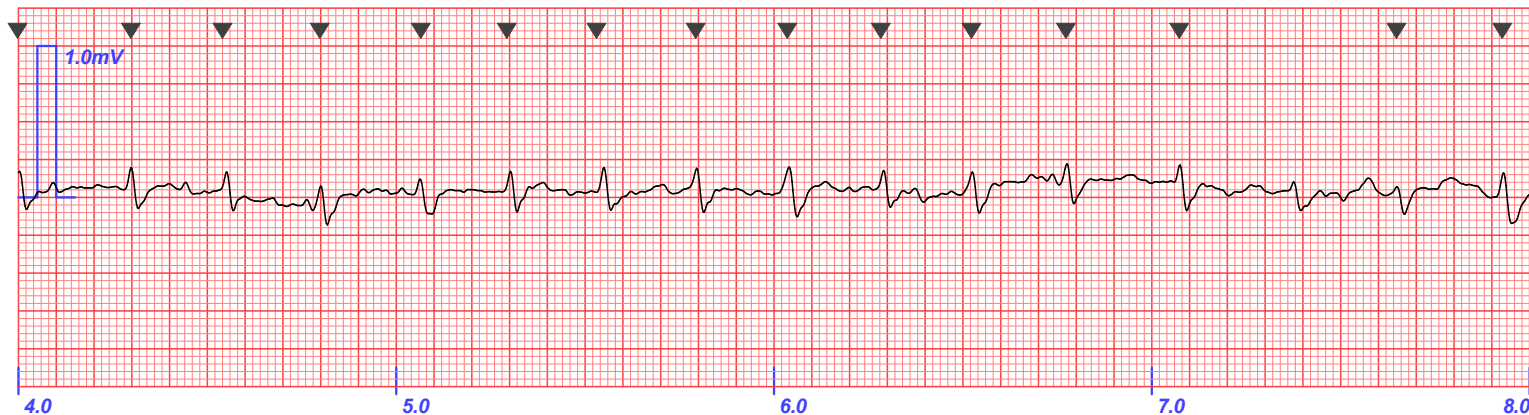
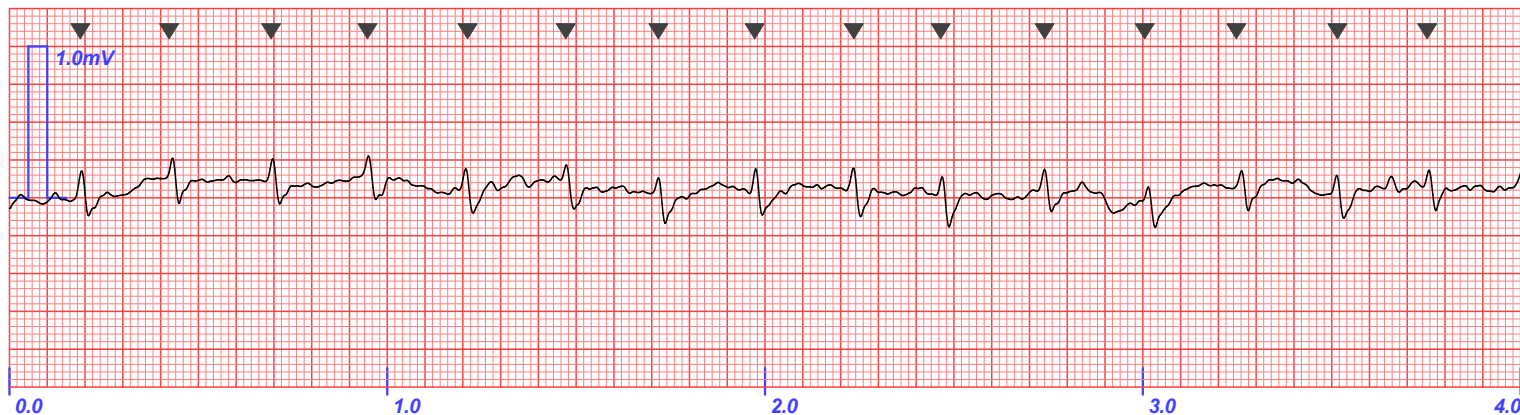


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:20:52
Elapsed Time: 00:01:06
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Patient Name/ID: Bird 10
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2013
Sex: Unknown
Weight: 0 lbs

Episode Date / Time: 05/14/2024 10:19:46
Episode Duration: 00:03:07



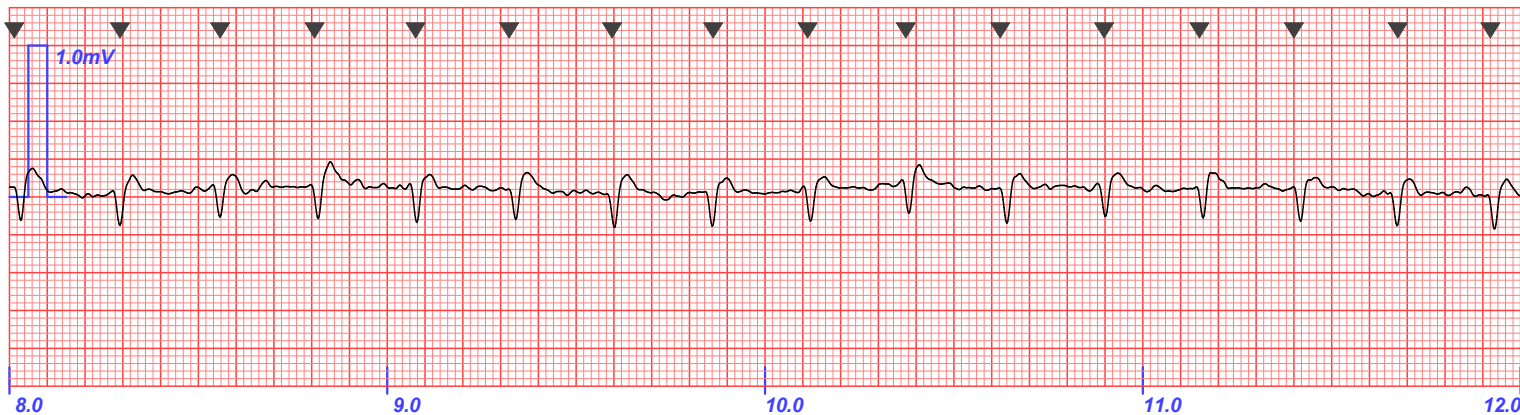
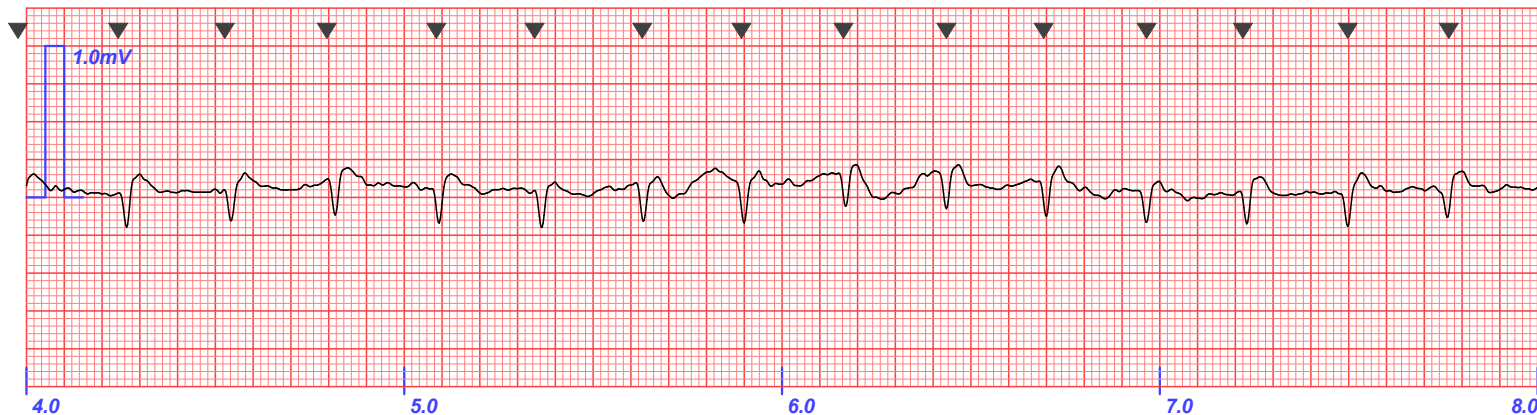
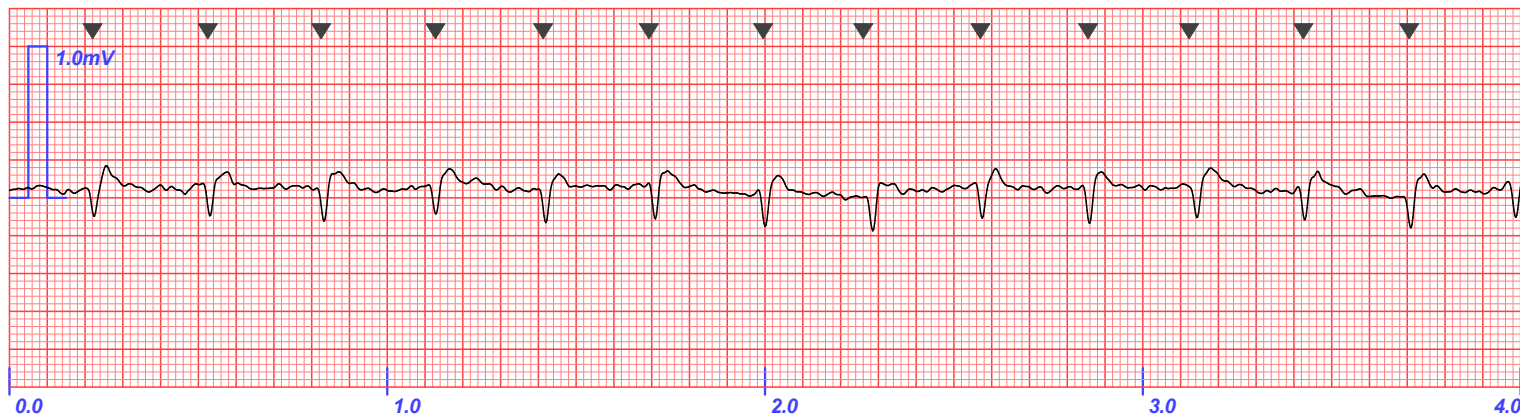


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:23:59
Elapsed Time: 00:01:00
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Episode Date / Time: 05/14/2024 10:22:59
Episode Duration: 00:02:47

Patient Name/ID: Bird 11
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2012
Sex: Unknown
Weight: 0 lbs

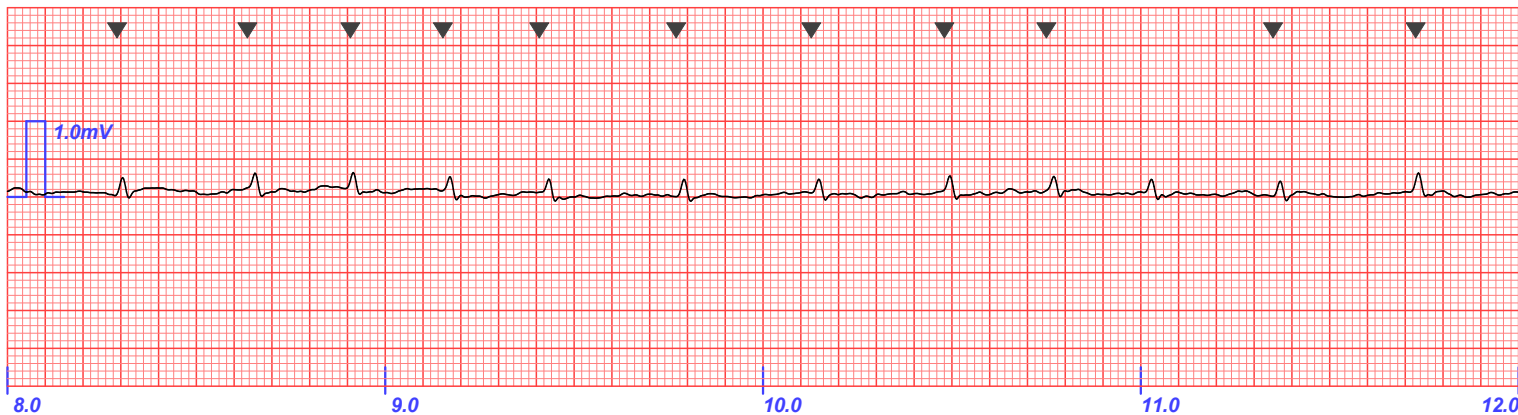
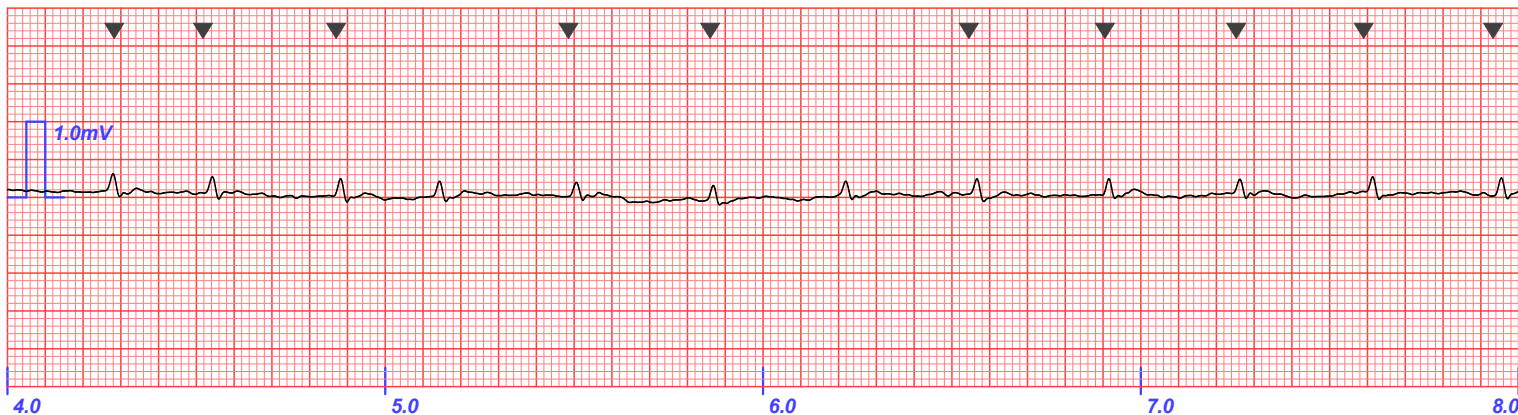
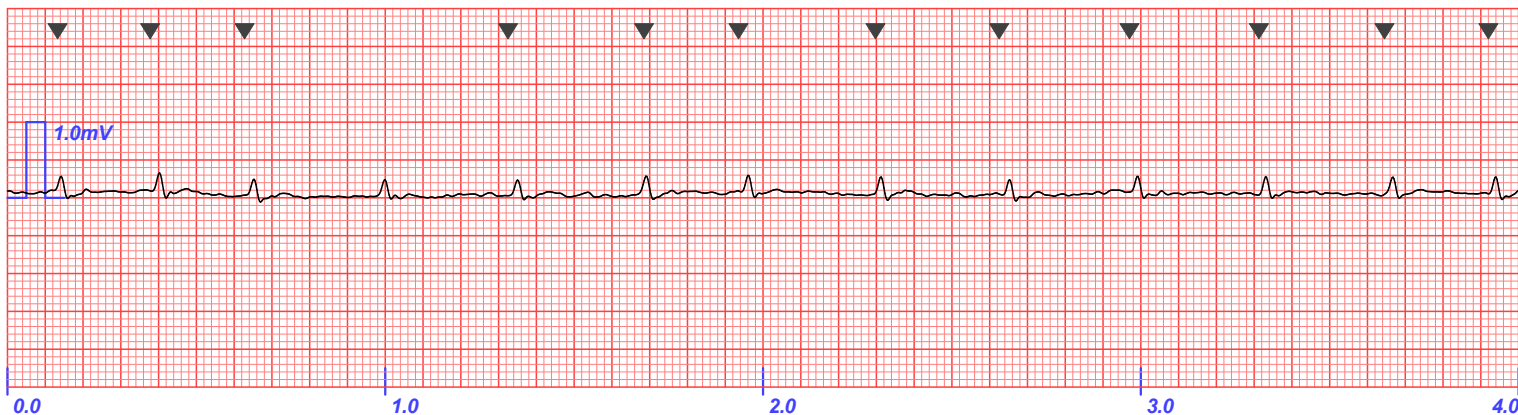




*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:27:09
Elapsed Time: 00:01:17
Sweep Rate: 50 mm/sec
Gain: (x1.0) 10mm/mV
ECG Filter / Notch: Low / 60Hz
Episode Date / Time: 05/14/2024 10:25:52
Episode Duration: 00:03:02

Patient Name/ID: Bird 12
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2011
Sex: Unknown
Weight: 0 lbs



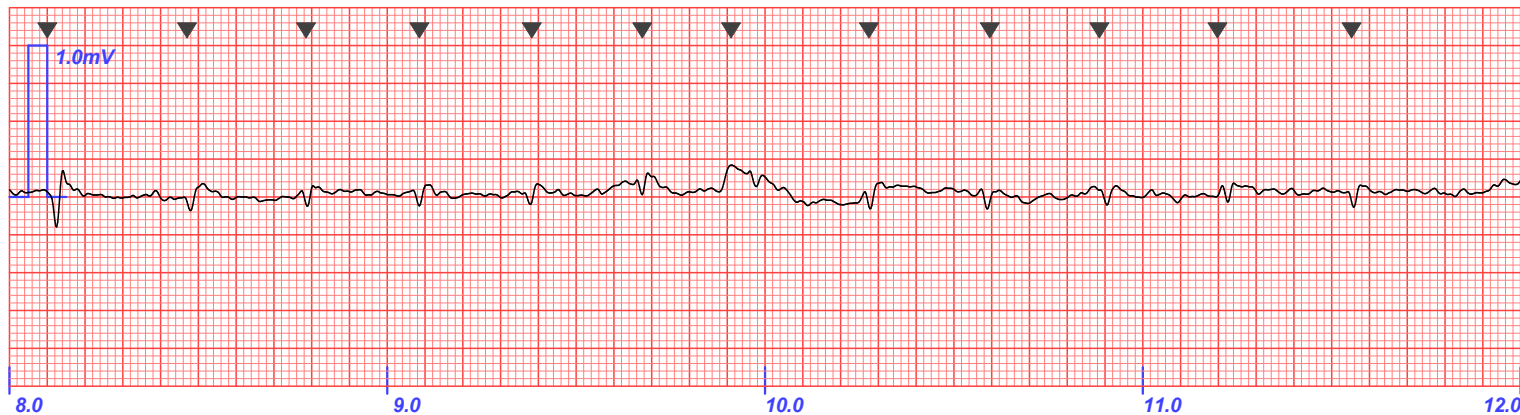
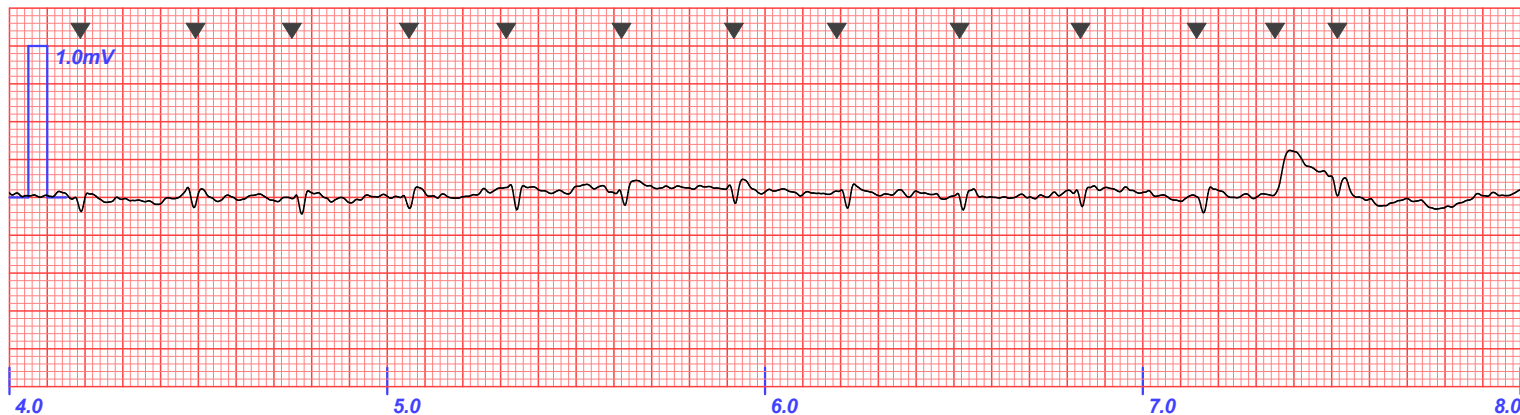
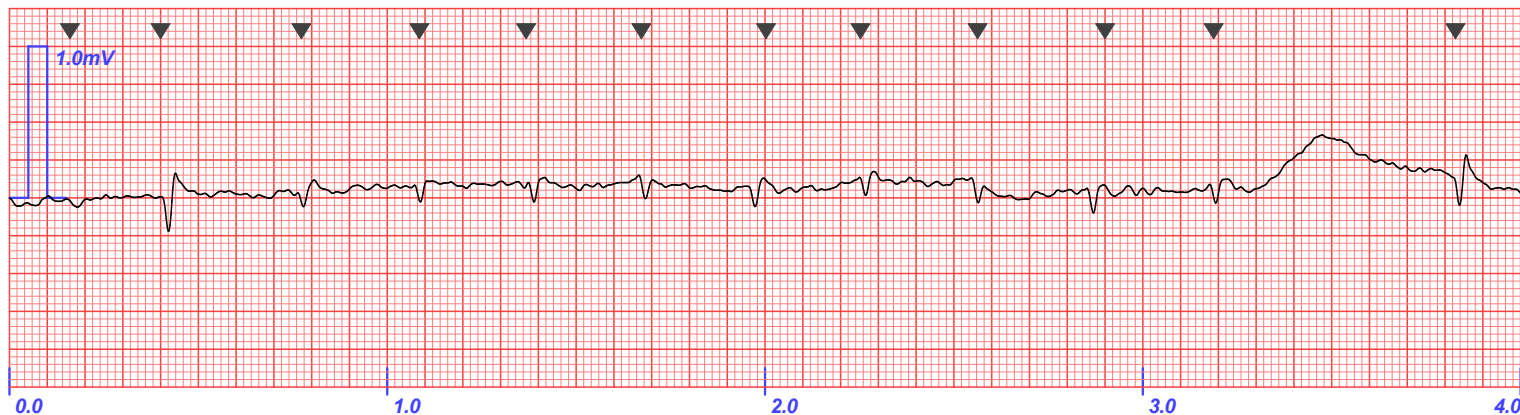


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:29:57
Elapsed Time: 00:00:57
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Patient Name/ID: Bird 13
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2010
Sex: Unknown
Weight: 0 lbs

Episode Date / Time: 05/14/2024 10:29:00
Episode Duration: 00:02:30



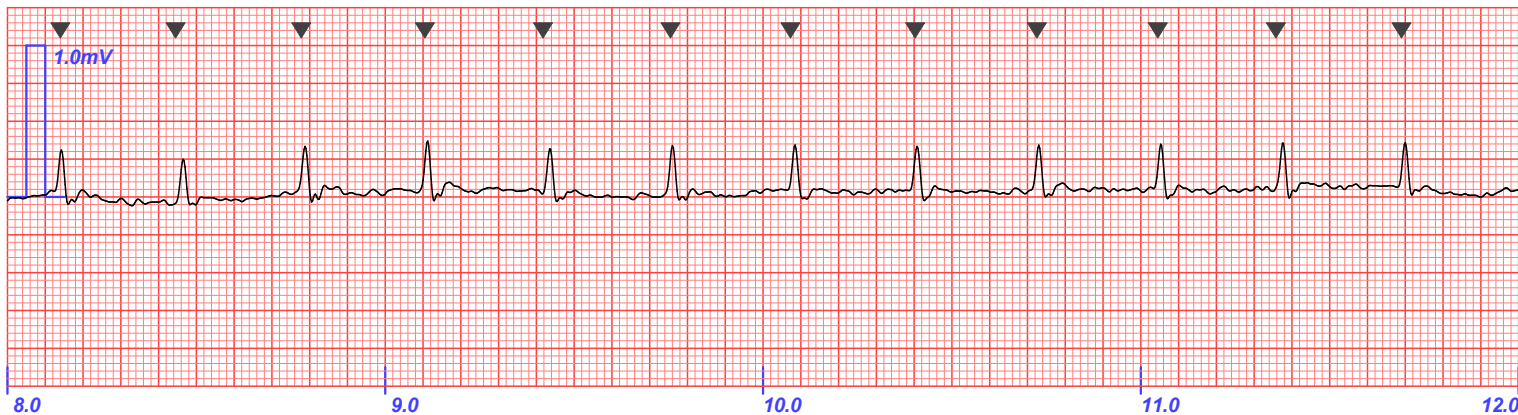
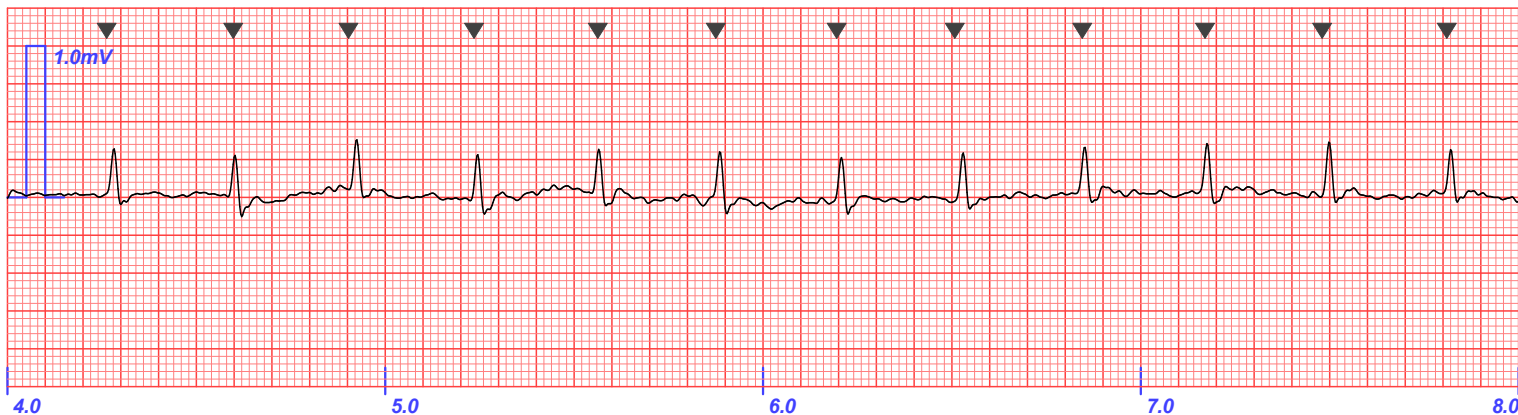
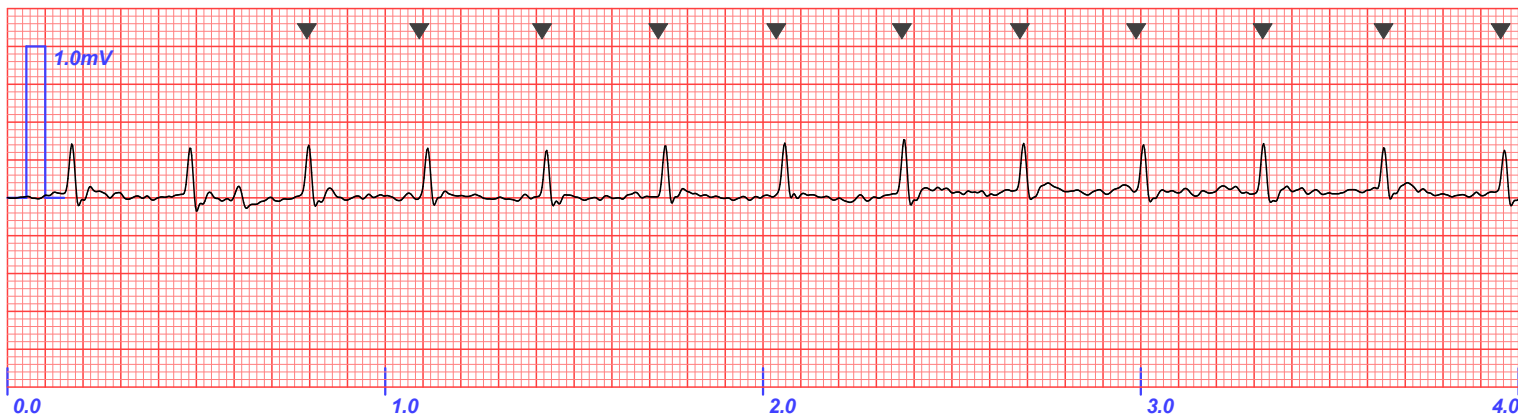


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:32:29
Elapsed Time: 00:00:51
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Episode Date / Time: 05/14/2024 10:31:38
Episode Duration: 00:02:54

Patient Name/ID: Bird 14
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2009
Sex: Unknown
Weight: 0 lbs



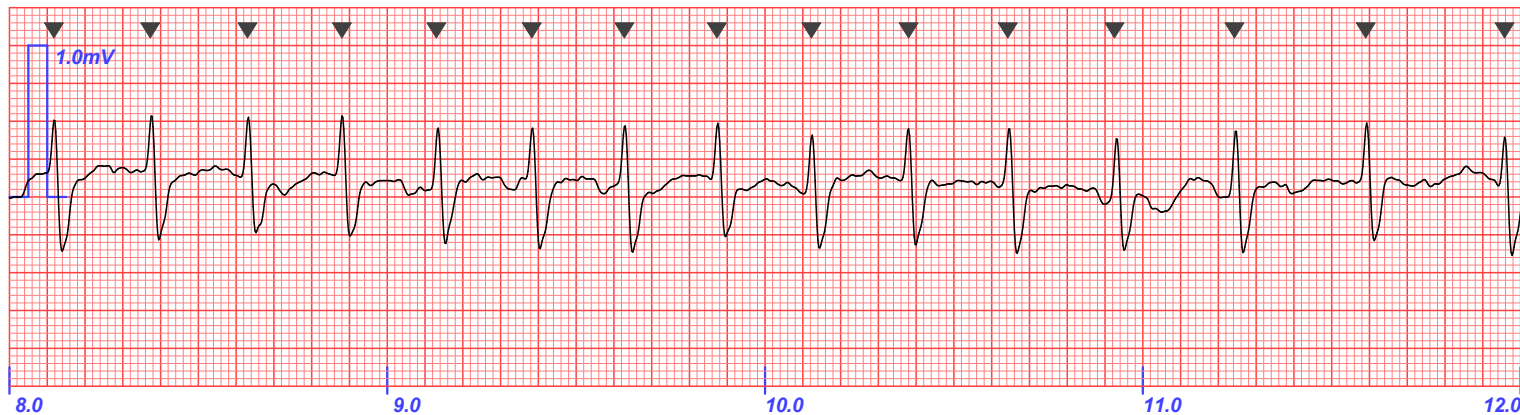
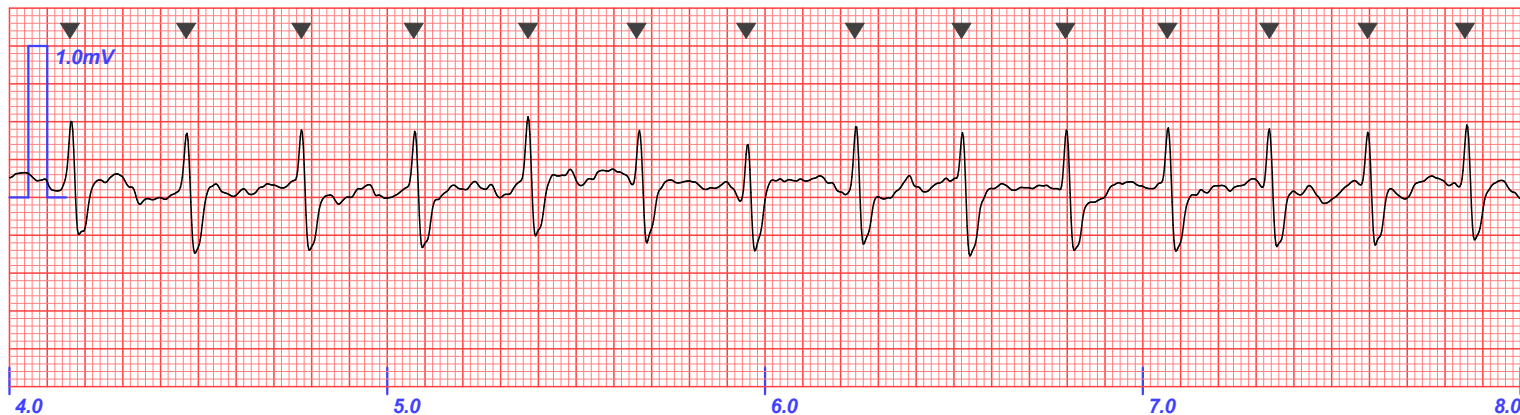
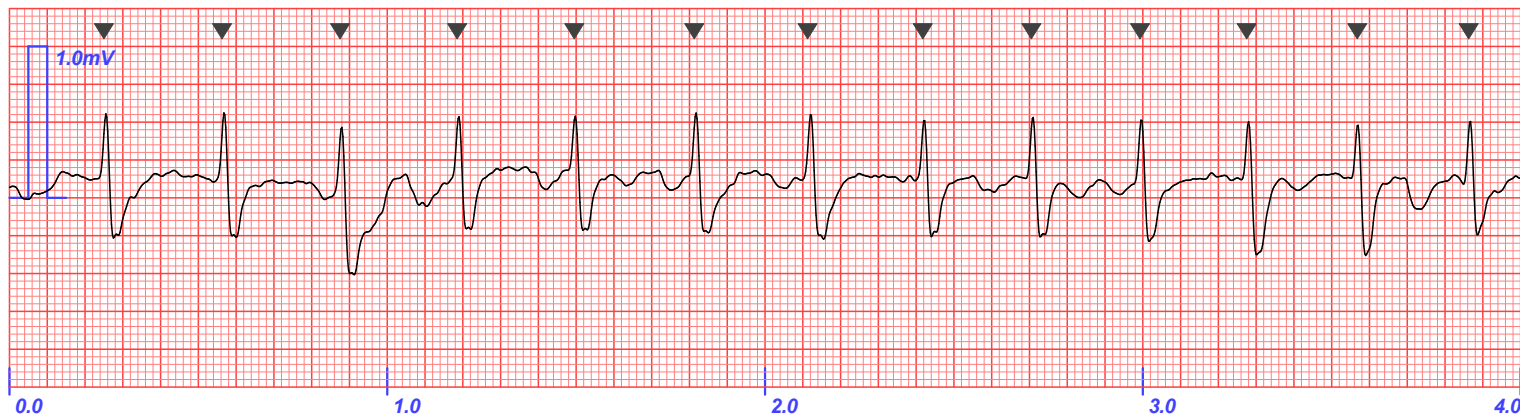


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:35:40
Elapsed Time: 00:00:59
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Episode Date / Time: 05/14/2024 10:34:41
Episode Duration: 00:03:03

Patient Name/ID: Bird 15
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2008
Sex: Unknown
Weight: 0 lbs



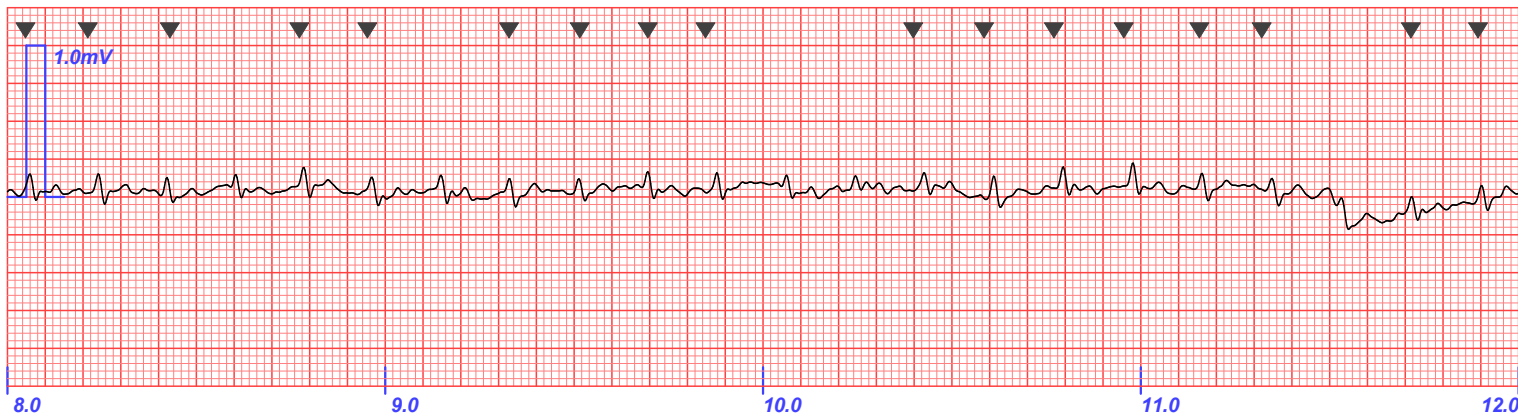
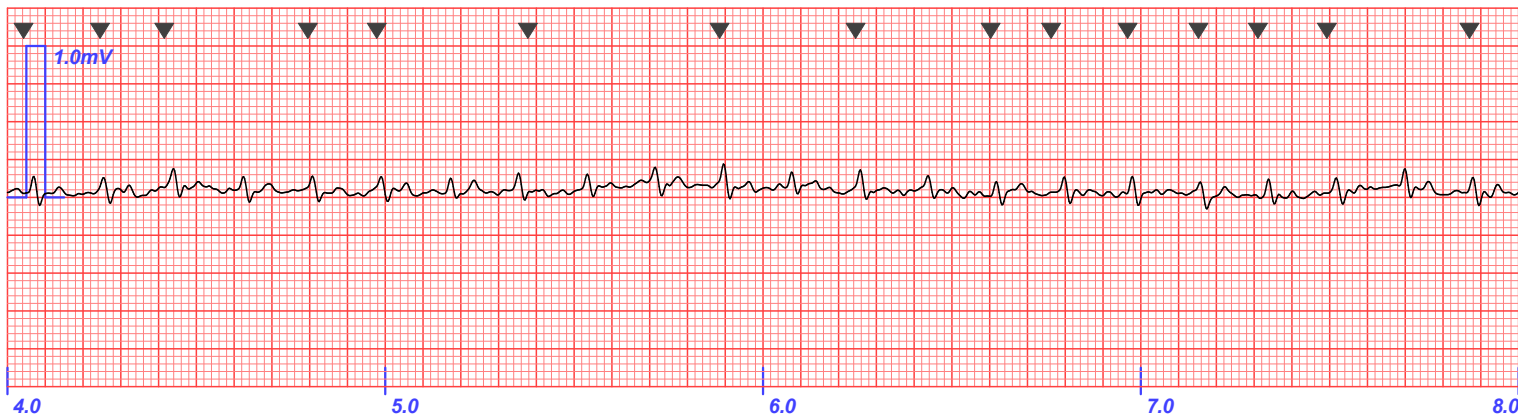
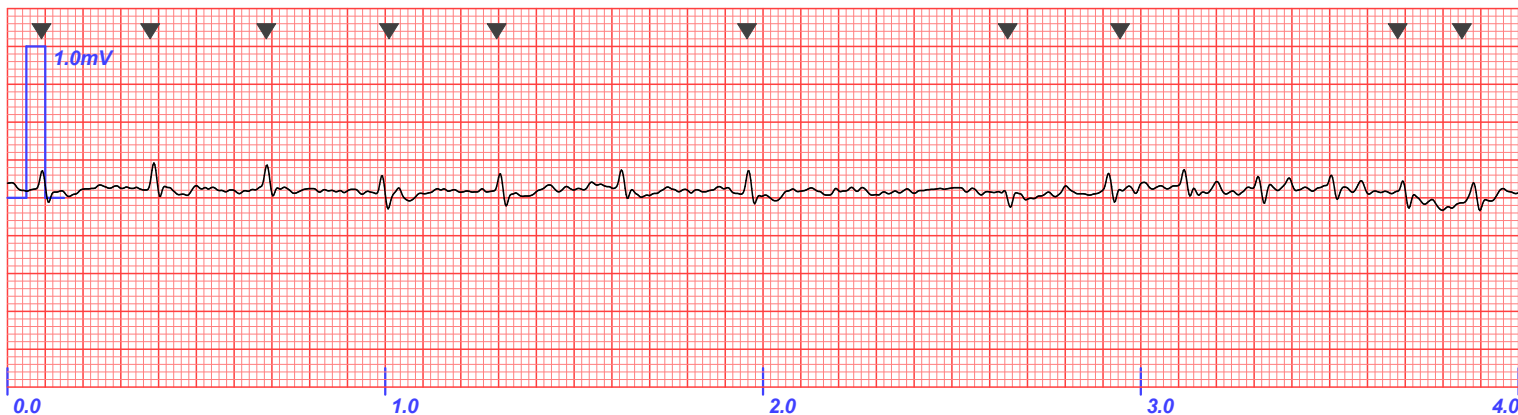


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:40:50
Elapsed Time: 00:02:59
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Episode Date / Time: 05/14/2024 10:37:51
Episode Duration: 00:03:25

Patient Name/ID: Bird 16
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2007
Sex: Unknown
Weight: 0 lbs



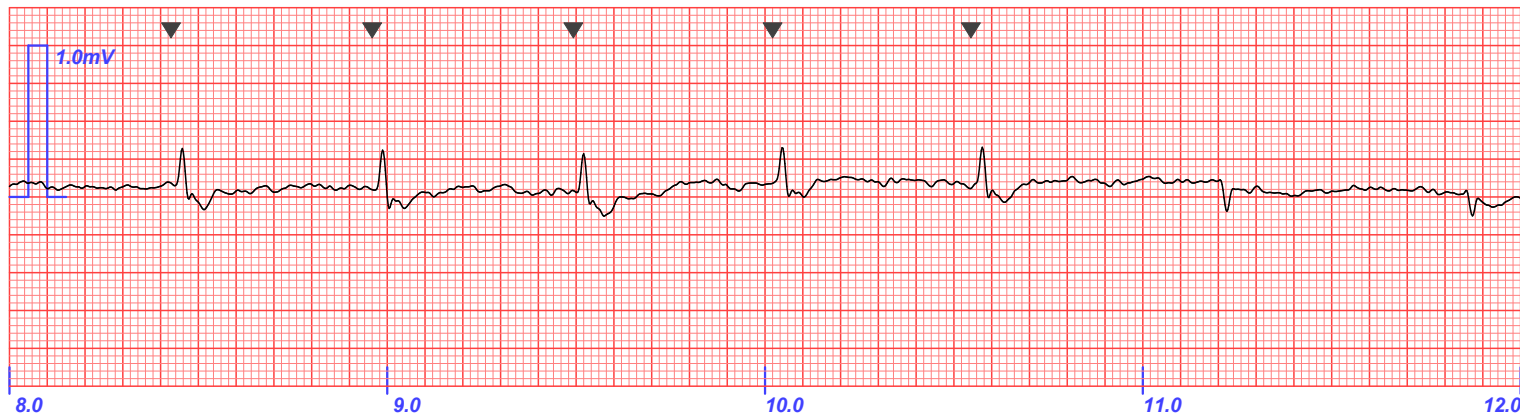
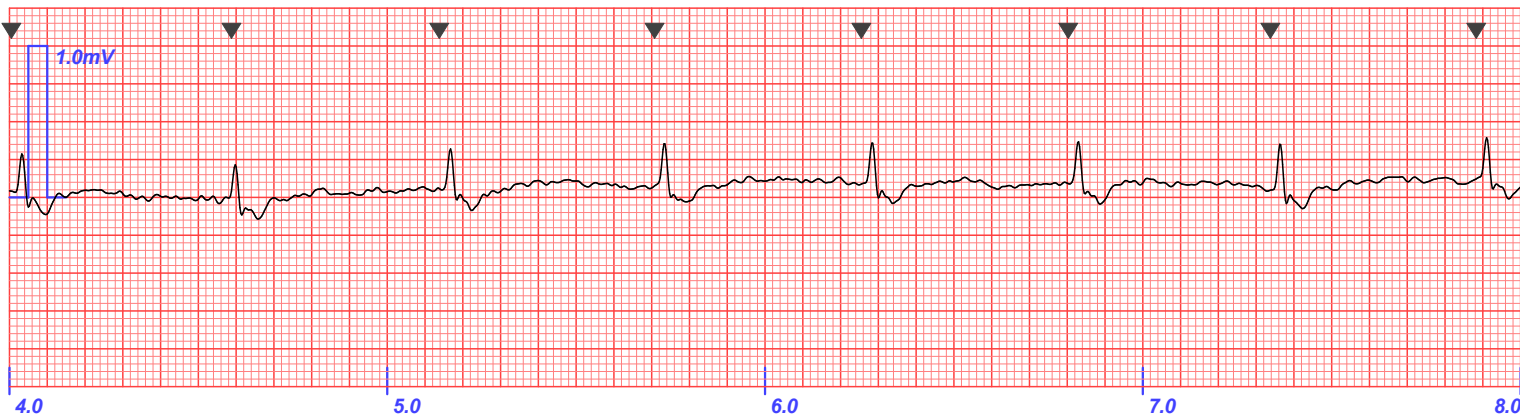
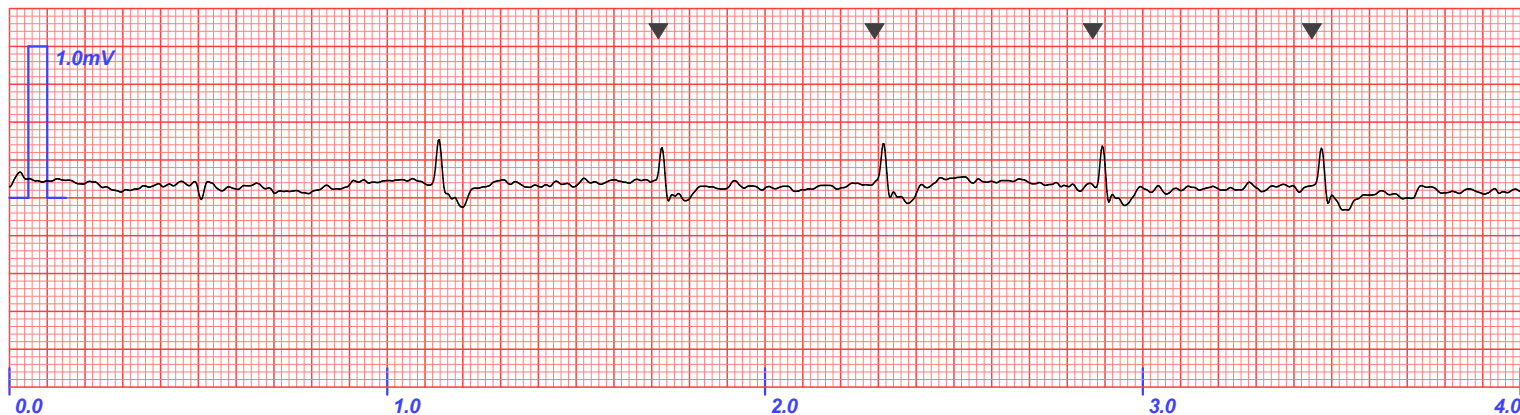


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:42:28
Elapsed Time: 00:01:06
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Episode Date / Time: 05/14/2024 10:41:22
Episode Duration: 00:03:02

Patient Name/ID: Bird 17
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2006
Sex: Unknown
Weight: 0 lbs



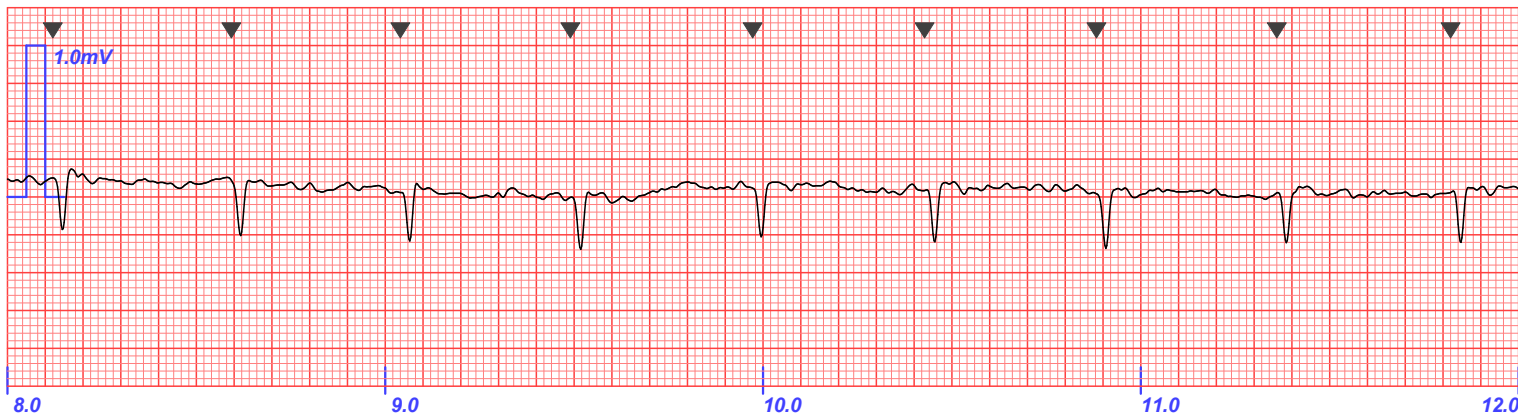
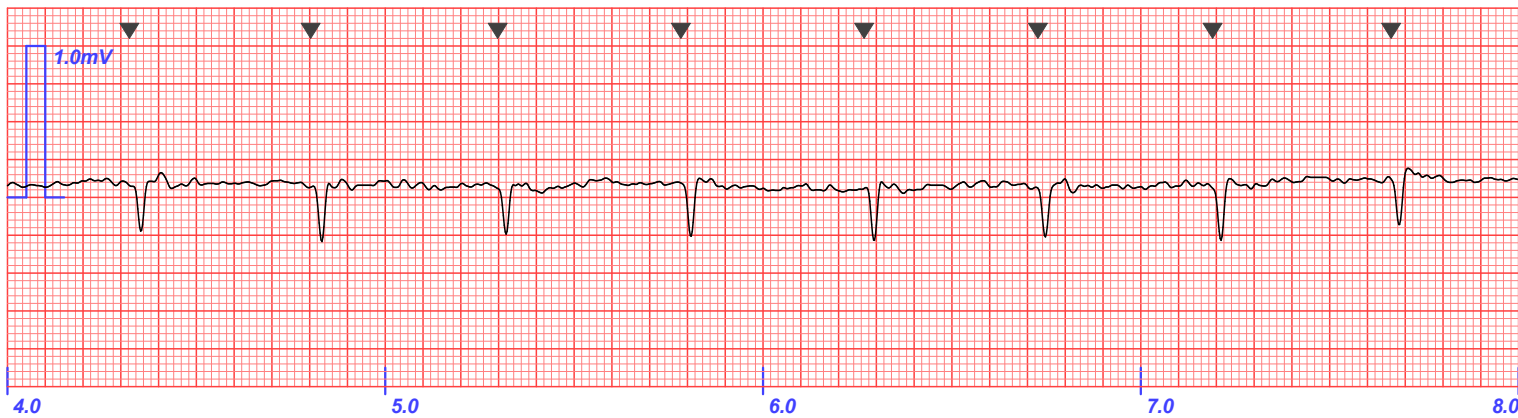
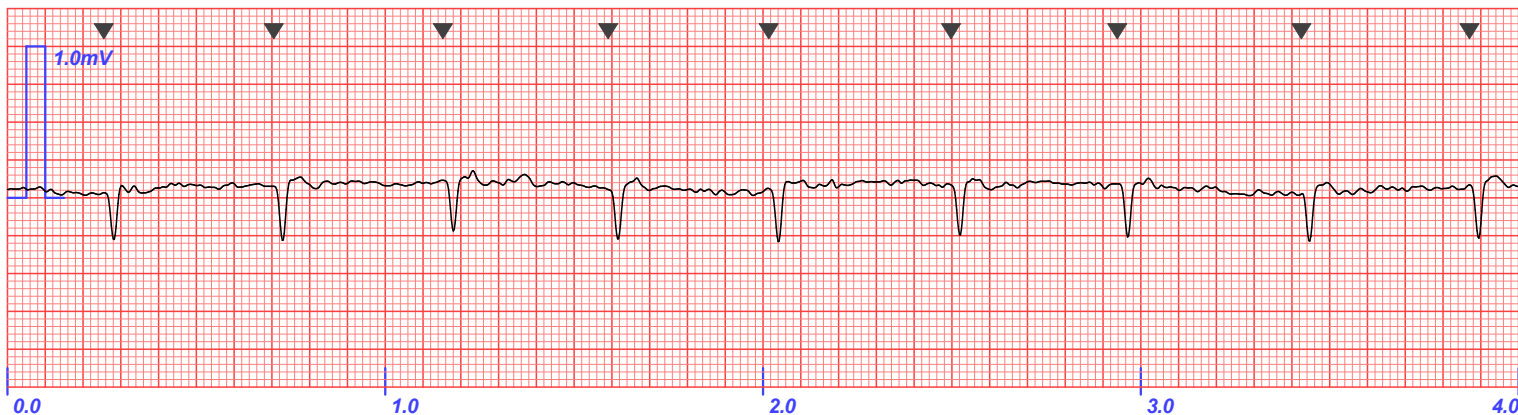


*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:45:36
Elapsed Time: 00:01:04
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz

Patient Name/ID: Bird 18
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2005
Sex: Unknown
Weight: 0 lbs

Episode Date / Time: 05/14/2024 10:44:32
Episode Duration: 00:03:25

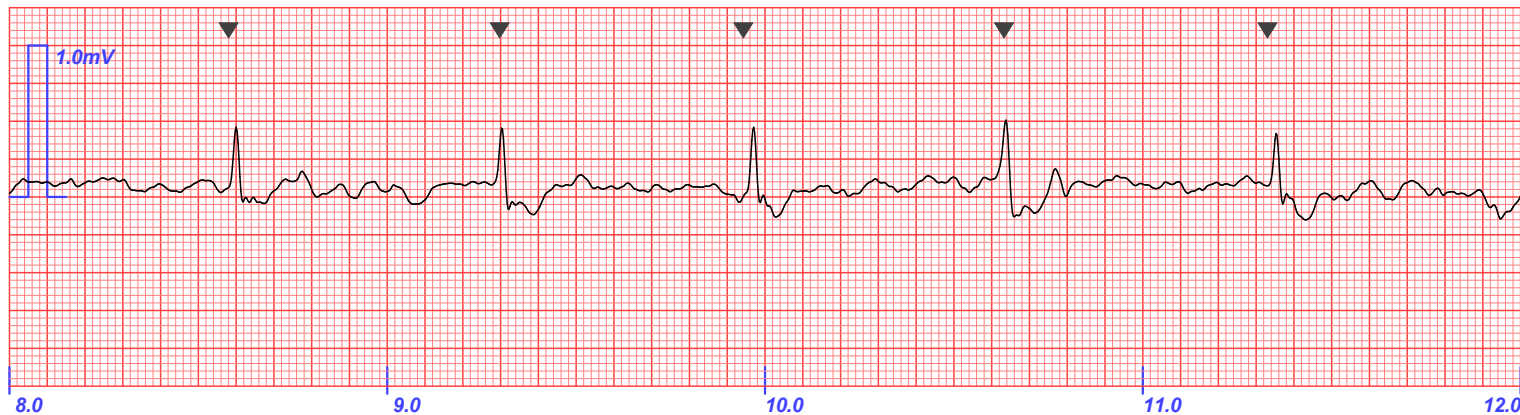
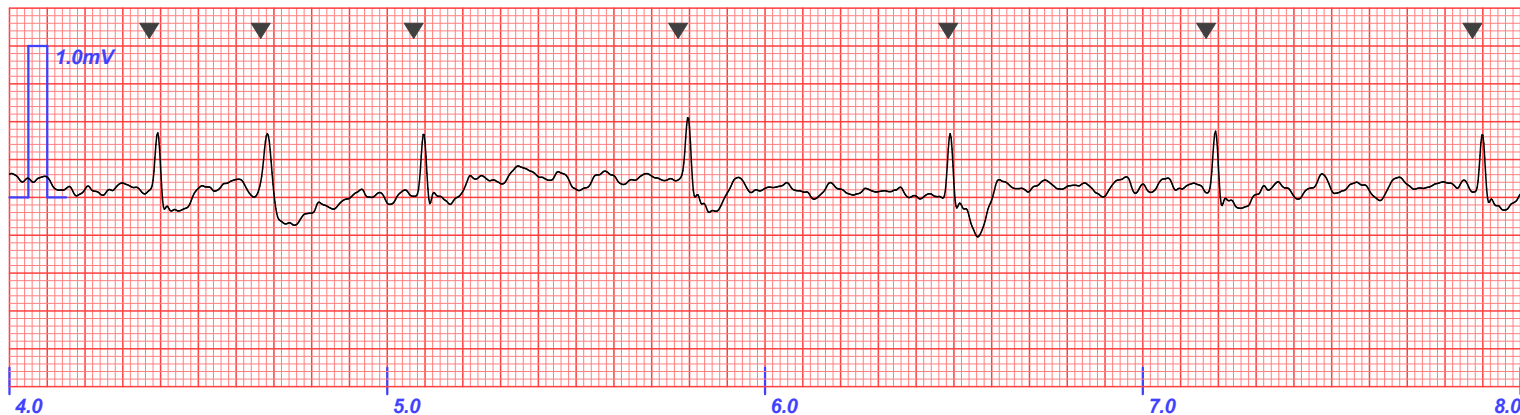
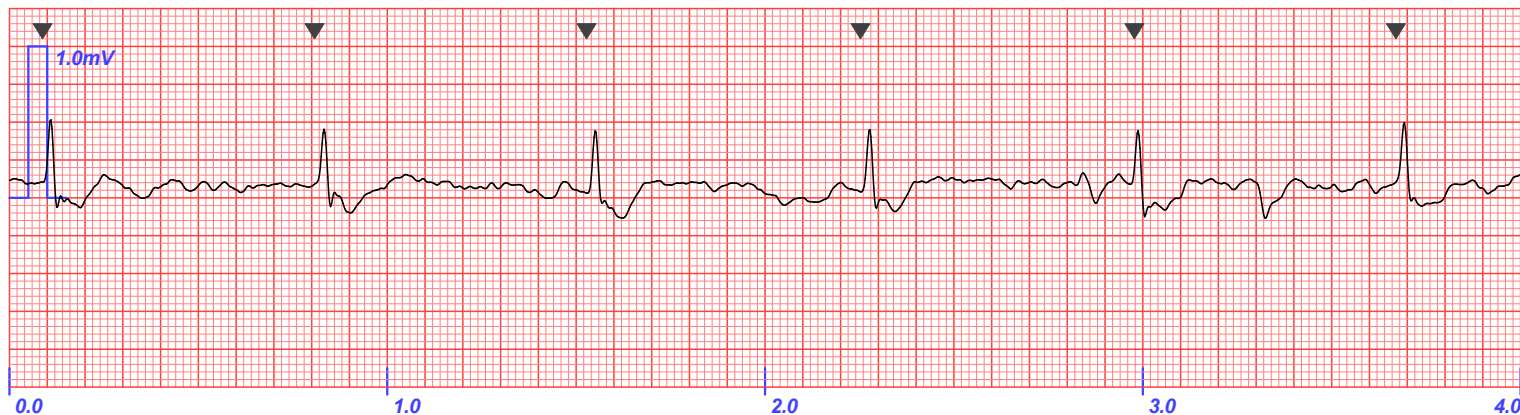




*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:49:32
Elapsed Time: 00:01:29
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz
Episode Date / Time: 05/14/2024 10:48:03
Episode Duration: 00:02:57

Patient Name/ID: Bird 19
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2004
Sex: Unknown
Weight: 0 lbs





*Veterinary
Monitoring
Report*

Date / Time: 05/14/2024 10:52:40
Elapsed Time: 00:01:33
Sweep Rate: 50 mm/sec
Gain: (x2.0) 20mm/mV
ECG Filter / Notch: Low / 60Hz
Episode Date / Time: 05/14/2024 10:51:07
Episode Duration: 00:02:48

Patient Name/ID: Bird 20
Owner:
Species: Avian
Breed: Unknown Avian
Birth Date: 01/01/2003
Sex: Unknown
Weight: 0 lbs

