

Evidence-Based Advances in Ferret Medicine



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KEYWORDS

• Ferret • Adrenal gland disease • Insulinoma • Lymphoma • Reference

KEY POINTS

- Ferret medicine is still a young discipline with a limited level of evidence.
- Randomized trials are still uncommon in ferret literature due to economic and ethical reasons.
- Clinical research could be stimulated through individual methodology and statistics but also through the creation of international working groups in order to progress in a more efficient medicine for ferret patients.

INTRODUCTION

Ferrets were domesticated about 2000 years ago. They were used primarily for hunting purposes and then as laboratory models, especially for influenza. Pet ferrets became popular worldwide in the early 1980s; ferret medicine started to grow from that time, with the first case report of estrogen-related aplastic anemia in a female ferret in 1981.¹ This literature review covers about 35 years of publications related to ferret medicine. The content of relevant articles was scrutinized by the authors, and pertinent clinical information was extracted. Whenever possible, several sources were confronted and compared.

CLINICAL EXAMINATION

Ferret clinical examination has the same requirements as other small mammals. Objective assessments include recording of the heart rate, respiratory rate, and rectal temperature (**Table 1**).

Heart rates reported in textbooks range from 160 to 250 beats per minute (bpm).^{6,7} Data were extracted from articles focusing on the echocardiography and

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Article Type	Number of Articles
Cross-sectional study	2 ^{2,3}
Prospective descriptive observational study	1 ⁴
Unrandomized crossover trial	1 ⁵
Narrative review	3
No access	3

electrocardiogram in ferrets. Because of the very active nature of ferrets, most of the studies were performed under anesthesia. Only one study (ranked with low level of evidence) reported about conscious examination.³ In such an article, the heart rate varied between 210 and 405 bpm.² Those records can be biased by several factors, including electrode implantation or handling, which may enhance stress or cause mild pain and, thus, increase the heart rate.

The same study demonstrated that females had significantly higher heart rates than males (300 ± 58 bpm vs 260 ± 34 bpm), and this was correlated to the body weight.² Another study reported a higher heart rate in ferrets younger than 6 months.⁵ Normal heart rates recorded under anesthesia in most studies ranged from 200 to 300 bpm.^{3–5,8}

Normal respiratory rates were rarely reported. One narrative review reported a rate between 33 and 36 breaths per minute.⁹

Body temperature was investigated with an implantable microchip and rectal thermometry.¹⁰ Normal temperature ranged from 99.0°F to 102.6°F (100.7°F mean; 37.2°C–38.9°C mean 37.8°C). Influence of reproductive status has been investigated in male ferrets whereby temperature was constant during the day but lower at night ($38^\circ\text{C} \pm 0.3^\circ\text{C}$ vs 37.3°C during mating season, 36.6°C during inactive period).¹¹

CLINICAL PATHOLOGY

Recommendations provided by the American Society for Veterinary Clinical Pathology are used for a definite species.¹²

For the hematology topic, the authors found 11 articles. It was difficult to compare various methodologies because cohort studies could hardly be compared with narrative reviews, which usually mix various sources to produce data. The effect of sex, age, breed, and method of sampling (under anesthesia or not) as well as method of analysis (manual method vs automated method) were reported.^{13–15} Although most values were comparable, marginal values should be interpreted with caution. The clinician should try, whenever possible, to obtain an individual reference value with a standardized sampling method and analysis (Tables 2 and 3).

Biochemistry was investigated in 8 articles. The same limitations from the hematology articles could be applied to biochemistry, although typically only 2 variables (sex and age) were studied (Tables 4 and 5).

A special effort in the literature can be noticed regarding glucose measurement, which is probably because hypoglycemia is one of the most common presentations in ferret emergencies. Glucose levels are usually measured using portable glucometer because of convenience, cost and because they limit glycolysis (consumption of glucose by the erythrocytes). However, there may be significant variation between

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