



A Comparative Analysis of Scientific and Practical Nutritional Guidelines for Pet Guinea Pigs

ABSTRACT

Despite the extensive body of research on guinea pig (*Cavia porcellus*) nutrition, there remains no clear consensus or consolidated summary of their optimal dietary requirements, particularly for companion animals. Much of the existing literature is derived from studies on laboratory guinea pigs, often under controlled experimental conditions that differ markedly from those experienced by pets. This study reviews and synthesises available scientific data on key nutrients (calcium, phosphorus, sugar, vitamin A, and vitamin C) and compares these findings with nutritional recommendations commonly provided to pet owners. The analysis highlights significant discrepancies between laboratory-based recommendations and those intended for domestic care. Based on a critical evaluation of the evidence, this paper proposes a recommended daily intake of **9–13 mg/day calcium, 10–14 g/day phosphorus, <1.4 g/day sugar, 50-170 µg/day Vitamin A, and 20-30 mg/day Vitamin C** for adult pet guinea pigs. These findings aim to support the development of more accurate, evidence-based dietary guidelines for improving the long-term health and wellbeing of pet guinea pigs.

1. Introduction

Although extensive research has been conducted on guinea pig nutrition, there is currently no single, comprehensive synthesis of these findings. As a result, determining the appropriate intake of specific nutrients for pet guinea pigs remains challenging for owners without direct reference to the primary scientific literature. Moreover, much of the available data pertains to guinea pigs used in laboratory research, and therefore may not accurately reflect the nutritional requirements of healthy pet guinea pigs.

This paper aims to address these gaps by first summarising the existing scientific literature on guinea pig nutrition and subsequently comparing these findings with dietary recommendations intended for pet owners. The objective is to identify evidence-based guidance on optimal dietary levels of calcium, phosphorus, sugar, vitamin A, and vitamin C that promote long-term health in pet guinea pigs.

2. Scientific Research

A considerable body of research has investigated the nutritional requirements of guinea pigs, largely owing to their widespread use in scientific animal testing. The following section summarises the findings of key studies relevant to the nutrients of interest and evaluates potential limitations in these data, particularly where experimental conditions may reduce their applicability to the dietary needs of pet guinea pigs.

2.1. Vitamin C

Undoubtedly the nutrient that is most researched in regards to guinea pig health is vitamin C. Guinea pigs are one of only a few species who are unable to synthesize their own vitamin C and must therefore acquire this entirely from their diet

(Witkowska et al. 2017). Failure to do this results in scurvy with symptoms such as Lameness, weight loss, lethargy, frequent infections and death (Keeble 2023).

Despite being well researched there is a significant variation in the amount of vitamin C recommended by the various sources. Tsuchiya H (1994) for example found that only 1mg of vitamin C per day was enough to match the growth rate of the control group who was fed significantly more. However, the guinea pigs in this study were young, with a starting weight of only 257g and the experiment only lasted for 8 weeks.

Other studies such as Fisher (2019) and Keeble (2023) found that 10 per guinea pig per day was optimal. Ecker and Pillemer (1940) also found that 10-20mg of vitamin C was enough to maximize blood-serum ascorbic acid while the natural diet of a guinea pig was found to contain around 30mg per day.

2.2. Calcium & Phosphorus

Scientific research into the optimal calcium and phosphorus intake for guinea pigs is fairly consistent across the scientific literature. For example in both Morris (1963) and O'Dell et al. (1960) the the optimal amount was deduced to be 0.8% calcium and 0.6% phosphorus of their feed, equivalent to around 360mg and 240mg per day respectively. Similarly Rummens K (2000) found that 9.6g of calcium per 1kg of feed (384mg per guinea pig per day) and 4.9g of phosphorus per 1kg of feed (196mg per guinea pig per day) was ideal.

There are however major issues with using this data to recommend the ideal intake for guinea pigs kept as pets. In all of these papers the animals that were studied were young, which is significant as young guinea pigs require more calcium to support bone development (Mannering 1949) and are also significantly less susceptible to the health issues caused by a high calcium diet (Edell AS 2022). All of these studies were also performed over a period of only a handful of weeks, which would not al-

low enough time to identify the long term health issues that pet owners will be most concerned about.

2.3. Sugar

There has been some research into how high sugar diets affect guinea pigs, mostly with the intention to cause them to suffer from glucose intolerance so they can be used to test the latest diabetes medications. One study, Muller CR (2021), fed young guinea pigs a high sugar diet that consisted of 35% sucrose for 12 weeks and then tested various health parameters such as their glucose tolerance, body composition, cardiac output, blood pressure, Heart Rate and hematological parameters. While there were no differences in their weight compared to being fed a normal diet they did suffer from dyslipidemia, glucose intolerance and damage in vital organs.

Another study, Podell BK (2017), again fed young guinea pigs a high sugar diet, in this case 52% (55% fructose and 45% sucrose). After just 8 weeks these guinea pigs were shows signs of diet-induced glucose intolerance similar to that of type-2 diabetes in humans.

These results show that very high sugar diets (over 14g per day per animal) can cause guinea pigs severe health problems within weeks. The results are however difficult to apply to guinea pig pet owners as while they identify unsafe levels of sugar that lead to a rapid decline in their health it does not identify what level of sugar is safe long term. All experiments also focused only on young animals which may not apply to adult guinea pigs of which pet owners will be most concerned with.

2.4. Vitamin A

Vitamin A is a vital nutrient for guinea pig health. Guinea pig's fed a diet low in this vitamin can show symptoms such as loss of body-weight, dryness of the cornea, matted eyelids and dyspnoea after 3 or 4 weeks (Howell et al. 1967). Gil et al. (1968) suggests that 1.67 and 9.9 mg/kg of feed is ideal with 6mg/kg being the amount at which guinea pigs will have enough excess to store it in the liver for future use, although unlike many small mammals guinea pigs can only store a few days worth (Mannering 1949). This equates to 67µg to 396µg per day with the optimal likely being around 240µg.

3. Comparison of Internet-Based Dietary Recommendations

3.1. Data collection

Examples of recommended daily fresh-food intake for guinea pigs were collected from a broad range of publicly available sources aimed at pet owners. Sources were identified through targeted web searches and included veterinary guidelines, animal rescue organisation recommendations, and owner-focused content such as blogs and discussion forums. Only English language sources were included.

From each source, examples describing an appropriate daily fresh-food allowance for a healthy adult guinea pig were extracted. Recommendations that did not provide a concrete, quantifiable example of daily intake, that referred exclusively to juvenile, elderly, pregnant, or medically compromised animals, or that were otherwise ambiguous were not included in the dataset.

Only fresh foods were considered. Recommendations relating to hay, pellets, or other dried or manufactured feeds were

excluded, as these components are generally assumed to be provided according to established best-practice guidance and were outside the scope of this analysis. Where sources described diets qualitatively rather than as precise weights, reasonable standardised interpretations were applied to allow inclusion, provided the intent of the recommendation was clear.

For consistency, all extracted diet examples were converted into explicit food lists and quantities and analysed using the Cavv nutrition database. Nutritional values reported by the original sources, when present, were not used. This ensured that all dietary examples were assessed using a single, standardised nutritional reference, allowing direct comparison between recommendations from different sources.

In total, 64 distinct daily diet examples were included. From these, descriptive statistics (including mean values, quartiles, 10th percentiles, and minimum and maximum values) were calculated for each nutritional variable of interest. These summary statistics are presented in tabular form in Appendix A.

3.2. Calcium

Calcium intake derived from the analysed daily fresh food diet examples showed a very wide range across sources (Appendix A). Values ranged from 6.3 mg to 38.1 mg per guinea pig per day, indicating substantial disagreement in owner facing recommendations. While the mean calcium intake was 13.86 mg, the distribution was notably skewed, with a long upper tail driven by a small number of high-calcium diet examples.

The median intake (12.9 mg) was lower than the mean, further highlighting the influence of high calcium outliers. The interquartile range spanned 10.25 mg to 16.33 mg, while the lower 10th percentile was 8.7 mg, suggesting that a meaningful proportion of sources recommend substantially lower calcium intakes than the overall average.

Given the breadth of recommended values and the well-documented prevalence of calcium related medical issues in pet guinea pigs (such as urinary sludge and urolithiasis) these findings support a cautious approach to dietary calcium. Rather than targeting the average of collated recommendations, guinea pig owners should aim for the lower end of the observed distribution when composing daily fresh-food diets.

Based on this analysis, a target range of approximately 9 mg to 13 mg of calcium per guinea pig per day from fresh foods is recommended. This range encompasses the lower 10th percentile through to the median of observed recommendations, balancing nutritional adequacy while reducing the risk associated with excessive calcium intake. Higher intakes, while present in some recommendations, appear disproportionately influenced by a minority of sources and may carry avoidable health risks in a typical pet setting.

3.3. Phosphorus

Phosphorus intake derived from the analysed daily fresh-food diet examples also exhibited a substantial range across sources (Appendix A), though with slightly less extreme upper values than observed for calcium. Reported intakes ranged from 8.3 mg to 25.2 mg per guinea pig per day, with a mean value of 14.41 mg.

As with calcium, the distribution was skewed toward higher intakes. The median phosphorus intake was 13.45 mg, lower than the mean, indicating that a subset of higher-phosphorus diet examples disproportionately influenced the average. The in-

terquartile range extended from 12.20 mg to 15.93 mg, while the lower 10th percentile was 10.41 mg, reflecting notable variation even among commonly cited recommendations.

However, phosphorus intake should not be evaluated independently. Appropriate calcium-to-phosphorus balance is critical in guinea pig nutrition, with best-practice guidance typically recommending that phosphorus intake exceed calcium intake by approximately 1.3 times in the daily diet.

In light of the wide range of observed values, the skew toward higher intakes, and the need to maintain a suitable calcium-to-phosphorus ratio—particularly when calcium intake is intentionally kept toward the lower end to mitigate urinary health risks—these findings support a conservative phosphorus target. Based on this analysis, a recommended daily phosphorus intake from fresh foods of approximately 10 mg to 14 mg per guinea pig is proposed. This range corresponds to the lower 10th percentile through to the median of collated recommendations and aligns closely with the phosphorus intake required to maintain a calcium-to-phosphorus ratio of approximately 1:1.3 when paired with the suggested calcium range.

Higher phosphorus intakes, while present in some sources, appear driven by a minority of high-end recommendations and may unnecessarily disrupt mineral balance when combined with calcium-restricted diets commonly advised for pet guinea pigs.

3.4. Sugar

Sugar intake derived from the analysed daily fresh-food diet examples showed a broad but comparatively constrained range relative to mineral intakes (Appendix A). Reported values ranged from 0.4 grams to 3.2 grams per guinea pig per day, with a mean intake of 1.50 mg. As with other nutrients, the distribution was skewed upward, with higher-sugar diet examples inflating the average.

The median sugar intake was 1.40 g, closely aligned with the mean, while the interquartile range spanned 1.08 mg to 1.83 mg. The lower 10th percentile was 0.80 mg, indicating that a substantial proportion of sources implicitly favour relatively low-sugar daily diets.

Unlike minerals such as calcium and phosphorus, sugar does not represent a nutritional requirement for guinea pigs and is primarily introduced through fruits and certain vegetables. Excessive sugar intake has been associated with adverse outcomes in pet guinea pigs, including digestive disturbance, obesity, and dental issues. The presence of high-sugar outliers in the dataset therefore warrants particular caution in interpretation.

Given this context, the upper end of observed recommendations should not be treated as a daily target. Instead, these values are more appropriately understood as reflecting occasional fruit-inclusive diets rather than routine feeding. Based on the lower end of the observed distribution, a typical daily sugar intake from fresh foods of approximately 0.8 mg to 1.4 mg per guinea pig is recommended for most days. This range corresponds to the lower 10th percentile through to the median and reflects diets composed predominantly of low-sugar vegetables and herbs.

Higher sugar intakes, up to approximately 2.3 mg or more, should be reserved for infrequent treat days, when small portions of fruit are offered. Even on such days, repeated exposure to the upper limits of observed sugar intake should be avoided, and fruit should be considered an occasional enrichment rather than a dietary staple.

3.5. Vitamin A

Vitamin A intake calculated from the analysed daily fresh-food diet examples demonstrated substantial variability across sources (Appendix A). Reported values ranged from 19.6 μg to 197.0 μg per guinea pig per day, representing nearly an order of magnitude difference between the lowest and highest recommendations. The mean intake was 110.35 μg , closely aligned with the median of 112.9 μg , though this apparent symmetry masks a wide underlying distribution. This also matches the large range of values recommended in the scientific literature.

The interquartile range extended from 68.13 μg to 148.83 μg , while the lower 10th percentile was 47.71 μg , indicating that many sources implicitly support relatively modest vitamin A intakes from fresh foods alone. Conversely, the upper decile and maximum values were driven by diets heavily weighted toward vitamin A-rich vegetables, suggesting that a minority of recommendations contribute disproportionately to higher reported intakes.

Based on the observed distribution, a typical daily vitamin A intake from fresh foods of approximately 50 μg to 170 μg per guinea pig is recommended for most days. This range spans the lower 10th percentile through to the 90th percentile of collected recommendations and broadly follows the scientific literature.

3.6. Vitamin C

Vitamin C intake derived from the analysed daily fresh-food diet examples showed a wide overall range, but a strong central clustering around values well established in the scientific literature (Appendix A). Reported intakes ranged from 3.4 mg to 75.9 mg per guinea pig per day, with a mean intake of 25.3 mg and a median of 28.25 mg.

The interquartile range (21.10 mg to 31.83 mg) closely aligns with commonly cited scientific recommendations for daily vitamin C intake in healthy adult guinea pigs. This concordance suggests that, despite variability in individual food choices and presentation, owner-facing diet examples tend to converge on similar vitamin C provision when fresh foods are composed with nutritional intent.

Very low intakes, reflected by the lower 10th percentile (5.12 mg) and minimum value, were driven by a small number of diet examples that either placed minimal emphasis on vitamin C-rich vegetables or implicitly assumed supplementation from other sources. These values fall well below established requirements and should not be interpreted as suitable targets when fresh foods are relied upon as a primary vitamin C source.

Conversely, the upper end of the distribution, particularly values exceeding 35 mg per day, appears to reflect diets intentionally enriched in vitamin C-dense foods. While acute excess vitamin C is generally considered to pose a lower risk than deficiency due to its water-soluble nature, chronically high intakes may be unnecessary in healthy animals receiving consistent daily provision.

Taken together, these findings strongly reinforce existing scientific guidance rather than suggesting the need for revision. The clustering of the majority of owner-facing recommendations around the mid-20 mg range provides independent, real-world support for the commonly cited target of approximately 20–30 mg of vitamin C per guinea pig per day from fresh foods. This range comfortably encompasses the interquartile distribution observed in this analysis and remains the most appropriate practical recommendation for healthy adult guinea pigs.

4. Conclusion

This analysis collated and quantified daily fresh-food feeding recommendations for pet guinea pigs from a wide range of owner facing sources and evaluated their nutritional consequences using a single, standardised database. This data was then also compared with the available scientific literature. Across all nutrients examined, recommendations showed substantial variability, often spanning several-fold differences between sources. This heterogeneity highlights the risk of relying on individual feeding examples without quantitative scrutiny and supports the need for cautious, evidence-informed guidance.

For minerals, both calcium and phosphorus exhibited wide distributions with pronounced upper outliers. Given the prevalence of calcium-related urinary disorders in pet guinea pigs, and the importance of maintaining an appropriate calcium-to-phosphorus balance, daily fresh-food diets should be formulated toward the lower end of observed recommendations rather than targeting average values. Based on this analysis, a calcium intake of approximately 9–13 mg per guinea pig per day, paired with a phosphorus intake of approximately 10–14 mg per day, is recommended. This pairing maintains a calcium-to-phosphorus ratio close to established best-practice guidance while reducing exposure to excessive mineral intake.

For sugar, while overall values were lower than those observed for minerals, the presence of higher-sugar outliers underscores the importance of treating fruit as an occasional component rather than a daily staple. For most days, daily sugar intake from fresh foods should remain around 0.8–1.4 grams per guinea pig, with higher intakes reserved for infrequent treat days and not approached habitually.

For vitamin A, the large spread of observed intakes reflects the concentration of this vitamin in a small number of commonly fed vegetables. Given its essential role but potential for excess, a conservative daily intake of approximately 50–170 µg per guinea pig from fresh foods is recommended for routine feeding, avoiding chronic exposure to the highest observed values.

For vitamin C, the collated owner-facing recommendations closely aligned with established scientific guidance. The clustering of values around the mid-20 mg range provides independent confirmation of existing recommendations. A daily intake of approximately 20–30 mg of vitamin C per guinea pig from fresh foods remains the most appropriate target for healthy adult animals.

Taken together, these findings support a feeding approach centred on moderation, balance, and consistency, with daily fresh-food diets designed to meet nutritional needs without repeatedly approaching upper limits. While individual variation and specific health conditions may warrant adjustment, these ranges provide a practical, evidence-informed framework for guinea pig owners seeking to optimise fresh-food feeding while minimising avoidable health risks.

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Appendix A: Descriptive statistics of recommended daily fresh-food diets for healthy adult guinea pigs from owner-facing sources (n = 64)

	Calcium (mg)	Phosphorous (mg)	Sugar (g)	Vitamin A (μg)	Vitamin C (mg)	Portion (g)
Average	13.86	14.41	1.50	110.35	25.30	49.86
Minimum	6.30	8.30	0.40	19.60	3.40	31.00
10th Quartile	8.70	10.41	0.80	47.71	5.12	36.60
Lower Quartile	10.25	12.20	1.08	68.13	21.10	41.75
Median	12.90	13.45	1.40	112.90	28.25	50.00
Upper Q	16.33	15.93	1.83	148.83	31.83	57.25
90th Quartile	18.95	20.01	2.34	176.74	34.70	60.00
Max	38.10	25.20	3.20	197.00	75.90	86.00