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Role of Metabolites for Detecting Physiological State of Wild Animals: European Rabbit (*Oryctolagus cuniculus*)

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Introduction

The spread of various diseases, such as myxomatosis and rabbit haemorrhagic disease, as well as habitat degradation and/or fragmentation put the European wild rabbit in danger. As a result, rabbit haemorrhagic disease is responsible for a high rate of mortality in European rabbits around 55% only in adults and this species has recently been designated as "endangered" by the International Union for Conservation of Nature (IUCN).Because it plays a significant ecological role in the Mediterranean ecosystem, the European wild rabbit (*Oryctolagus cuniculus*) is categorized as a keystone species.

The introduction of keystone species is a crucial step in the ecological restoration of degraded ecosystems, as the loss of these species is essential to the structure and operation of the ecosystem. Animal nutrition plays a crucial and constraining role in the recovery of these species in this context. Ecological nutrition's overarching objective is to unravel the complex network of nutritional links that drives animals' interactions with their social and ecological environments. In addition, it has the potential to contribute to a number of different areas of research, including conservation physiology.

Description

The management of endangered wildlife can be addressed with the help of molecular analytical tools in ecological nutrition. Understanding how these animals' populations are affected by nutrient availability and use can be made easier with a better understanding of the metabolic phenotype diversity and its relationship to diet type and feeding patterns. Additionally, studying the metabolic phenotypes of various wild animal reproductive stages can provide us with additional biological data. It is essential to improve recovery, adaptation, and conservation plans for wild rabbits in order to preserve many carnivore species, including the Iberian lynx, which has low effective population numbers at the moment. It is also crucial to preserve species with low effective population numbers, such as the lynx, which has low effective population numbers at the moment. As a result, we hypothesized that some nutritional metabolites might provide biological information that could be used as biomarkers to determine the feeding level, reproductive stage, and species fitness.

The primary objective of this study was to determine the relationship between various biological characteristics and the potential of certain nutritional metabolites as biomarkers for the conservation of the European wild rabbit (*Oryctolagus cuniculus*). Estimates of previous feed intake can be used to estimate stomach content. The differences between the physiological stages that have been observed are then developed. The variables analyzed were also influenced by the various sexes and stages of reproduction. Females are capable of adjusting their metabolic profile and feed intake in accordance with their nutritional requirements. As a result, even though the animals have the same metabolic profile, it is important to take into account the animals' previous feed intake in order to properly interpret the metabolite results. This is because nutritional use may vary between feed intakes even though the animals have the same metabolic profile. In addition, the reproductive peak could be the reason why males consume less food than females do because males are more interested in finding receptive females during this time than in eating or doing other activities. Blood metabolite levels may be linked to previous feed. This is the case with the PUN, in which, under controlled conditions, the PUN is proportional to the amount of protein consumed. The fact that there were no significant differences in the metabolites analyzed between males and a female, despite the females' significantly higher intake, raises the possibility of distinct feeding or resource acquisition strategies among these two groups. According to the concept of the mechanistic field of reproductive ecology, there is a studied relationship between the availability of energetic nutrients and animal reproduction. The females reproductive status was clearly distinguished by the energetic and protein metabolites. Changes in different blood plasma metabolites affirm the serious alteration of digestion in pregnancy and in the developing period. During this time, the low levels of glucose and albumin in the blood suggest either that pregnancy has depleted the body's energy stores or that there is no energy available for tissue deposition .Non-reproductive females had higher levels of NEFA than pregnant females, indicating a brief mobilization of adipose tissue [1-5].

This suggests a connection between these metabolites and the reproduction of this species, as the lower NEFA levels of pregnant females may indicate a lower expenditure of body reserves compared to non-reproductive females. As a result, when comparing females, distinct metabolic profiles can be observed. Even though there are no significant differences in any of the metabolites analyzed between the various reproductive stages, the metabolic behavior may differ. This is, for instance, the case with the PUN. We discovered that pregnant females, in contrast to non-breeding females, have a tendency to have lower levels of urea when their intake increases. This would suggest that pregnant females use resources more effectively when nutritional requirements rise during the reproductive season. The animals' physiological state also had an effect on concrete, energetic metabolites like glucose and NEFA. Nonetheless, for this situation, protein metabolites and egg whites were not impacted by the conceptive stage. The management of ecosystems, for instance, could benefit from knowing about biomarkers related to reproductive stages. To increase European wild rabbit populations and, consequently, the resilience of the Mediterranean ecosystem, it is necessary to incorporate conservation strategies for endemic plants.

Conclusion

The main takeaway from our research is that nutritional metabolites have the potential to serve as biomarkers for the conservation of European wild rabbits (*Oryctolagus cuniculus*).The following are the conclusion: i) Regardless of their weight and reproductive status, females have a greater capacity for feeding than males, affecting their metabolism. Differentiation of reproductive stages is made possible by the metabolic profiles of animals with distinct metabolic phenotypes and metabolic behaviors. Females appear to maximize resource utilization more effectively than males. ii) As biomarkers of the physiological states of animals, glucose, NEFA, and albumins demonstrated potential.

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