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Enhancing donkey milk yield through optimized nutrition: A case study from Georgia

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Abstract

Donkey milk, recognized for its hypoallergenic properties and nutritional richness, offers significant potential in agriculture and healthcare. This study evaluates a formulated combined feed's impact on milk productivity in Georgian donkeys. The feed, comprising barley (49%), corn (15%), sunflower meal (10%), wheat (10%), bran (8.8%), alfalfa (6.7%), and salt (0.5%), was tested on the "Virlandia" farm. Results showed a 60–70% increase in daily milk yield (500–700 g vs. 200–450 g in the control group). The feed demonstrated excellent palatability, supporting its viability for revitalizing Georgia's donkey farming sector.

Keywords: Donkey milk; Lactation; Combined feed; Hypoallergenic; Sustainable agriculture

1. Introduction

Donkey farming in Georgia, historically focused on labor, has declined due to mechanization. Recent scientific interest in donkey milk's therapeutic and nutritional value—particularly for infant nutrition and pharmaceuticals—necessitates improved husbandry practices. This study addresses low milk yields in local breeds through optimized nutrition, aiming to enhance lactation efficiency and economic viability.

2. Materials and Methods

2.1. Animal Description

- **Species**: *Equus asinus* (Georgian local breed).
- **Physiology**: Monogastric herbivores, gestation period 12–13 months, lifespan 35–40 years.

2.2. Feed Formulation

Table 1 Composition of Combined Feed

Component	% Composition
Barley	49
Corn	15
Sunflower Meal	10
Wheat	10

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Bran	8.8
Alfalfa	6.7
Salt	0.5

2.3. Production Process

- **Scale**: Raw material weighing.
- **Grinding**: Particle size reduced to 2–3 mm.
- **Mixing**: Homogeneous blending (20 minutes).
- **Packaging**: 25 kg/bag.

2.4. Experimental Design

- **Control Group**: Pasture grazing only (*n* = 20).
- **Experimental Group**: Grazing + 1 kg/day combined feed (*n* = 20).
- **Ethics**: Approved by Georgian Technical University Animal Ethics Committee (Protocol GTU-AEC/2023-05).

3. Results and Discussion

3.1. Donkey Milk Composition

Table 2 Nutritional Profile of Donkey Milk

Component	% Composition
Protein	1.5–1.8
Lactose	5.8–7.4
Fat	0.3–1.8

3.2. Feed Analysis

Table 3 Chemical Analysis of Combined Feed

Component	% Composition
Moisture	13.0
Protein	13.0
UEN*	62
UEN: Unité Fourragère Lait (Feed Unit for Lactation).	

3.3. Milk Yield

- **Control Group**: 200–450 g/day.
- **Experimental Group**: 500–700 g/day (**$p < 0.01$**, ANOVA with Tukey's post-hoc test).
- **Discussion**: The feed's high protein (13%) and balanced fiber (6.4%) drove increased lactation, aligning with global studies on ruminant nutrition [1].

4. Conclusion

The combined feed improved milk yield by 60–70%, demonstrating its potential to enhance Georgian donkey farming. Future studies should assess long-term health impacts and scalability.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The authors declare no competing interests.

Statement of ethical approval

Ethical approval was granted by Georgian Technical University (Protocol GTU-AEC/2023-05). Animal care followed institutional guidelines for humane treatment.

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