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NUTRITIONAL EVALUATION OF BARLEY AS FEED FOR MONOGASTRIC ANIMALS

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Abstract: Barley (Hordeum vulgare L.) is a widely cultivated cereal grain with significant potential as a feed ingredient for monogastric animals. This study aimed to assess the nutritional value of barley for monogastric animals by analyzing its chemical composition and calculating its metabolizable energy. The proximate analysis revealed that barley contained crude protein (CP) at 10.228%, ether extract (EE) at 2.815%, crude fiber (CF) at 4.293%, and nitrogen-free extract (NFE) at 69.230%. Additionally, the calculated metabolizable energy content of barley was found to be 2852.619 kcal/kg. These findings indicate that barley possesses a balanced nutritional profile suitable for monogastric animal diets, providing adequate levels of protein, energy, and fiber. Incorporating barley into animal feed formulations could contribute to sustainable and cost-effective livestock production systems while ensuring optimal performance and health of monogastric animals. Further research is warranted to investigate the effects of barley inclusion levels and processing methods on animal performance and nutrient utilization to optimize its utilization in monogastric animal diets. Table 1. Keywords: barley, animal nutrition, monogastric animals, metabolizable energy Statistical evaluation of barley chemical composition

Introduction

Traditionally valued for its use in brewing and as a food source, barley has also gained significant importance in the field of animal nutrition, particularly as feed for monogastric animals such as pigs and poultry. The nutritional evaluation of barley is crucial to maximize its potential benefits while ensuring the health and productivity of the animals. Before incorporating barley into animal feed, conducting a comprehensive chemical analysis is imperative. By performing these analyses, producers can formulate balanced diets, optimize feed utilization, and prevent nutritional deficiencies or imbalances in monogastric animals. So, the aim of the study was to assess the nutritional value of barley for monogastric animals by analysing its chemical composition and calculating its metabolizable energy in order to guide the farmers on barley inclusion levels in monogastric animals diets to optimize the animals growth performance and productivity.

Material and method

Statistic values	М	DM	Ash	СР	EE	CF	NfE
and the second s		-	2000				
Mean	11.16906	88.83098	2.26498	10.228	2.81498	4.29298	69.23
Standard Deviation	0.699828	0.937344	0.194094	0.95596	0.348411	0.397813	0.842476
Minimum	9.848	87.538	1.821	8.424	2.157	3.542	67.64
Maximum	12.29	90.695	2.589	11.76	3.373	4.93	70.58
Confidence Level							
(95.0%)	0.198889	0.26639	0.055161	0.271681	0.099017	0.113057	0.239429

Metabolisable energy is a critical measure of the energy available to animals from feed after digestion and absorption. The high ME value of barley highlights its efficiency as an energy source, supporting the energy needs of monogastric animals for maintenance, growth, reproduction and productive performance.



This study involved the analysis of 50 samples of barley harvested in 2022 from the Western Plain, Timis County, Romania. The analyses were conducted at the Animal Nutrition Laboratory of the Faculty of Veterinary Medicine in Timișoara. To determine the crude chemical composition of the seeds, the following parameters were measured: moisture (M%), dry matter (DM%), total ash (Ash%), crude protein (CP%), ether extract (EE%), crude fiber (CF%), and nitrogen-free extract (NfE%). Standardized methods for chemical analysis of feeds, adapted by the laboratory equipment manufacturer, were utilized during sample processing. The ME (kcal/kg) was calculated using the ATWATER formula based on 4/9/4 system, from the caloricity of each gram of nutrient, i.e. protein, fat and carbohydrate.

 $M.E.(kcal/kg) = [(4 \times C.P.) + (9 \times E.E.) + (4 \times C.F.) + (4 \times NfE.)] \times 10.$ Statistical data processing was carried out using Excel Data Analysis. This included the calculation of statistical correlations and descriptive statistics, with results analyzed through the identification of positive or negative correlations between obtained data. The processed data were presented in tables and diagrams.

Results and discussions

The nutritional evaluation of barley as a feed for monogastric animals was based on the analysis of its chemical composition. The results reveal the average values for several critical parameters: moisture, dry matter, ash, crude protein, ether extract, crude fiber and nitrogen-free extract (table 1). The chemical composition analysis of barley demonstrates its suitability as a feed ingredient for monogastric animals. With balanced levels of protein, fat, fiber, and energy, barley can effectively meet the nutritional requirements of these animals. The moisture and ash contents also suggest that barley provides essential minerals and has good storage stability.



Fig. 1. Statistical corelations between the nutritive components of barley and its ME

By making correlations between the determined chemical nutrients and the value of metabolizable energy it can be seen in Fig. 1. that all organic components, without exception, showed positive correlations with ME. In conclusion, this study has demonstrated that barley is a nutritionally valuable and cost-effective feed ingredient for monogastric animals. Its balanced profile of proteins, fibers, and energy, coupled with its beneficial impact on digestive health, makes it an excellent choice for inclusion in animal diets. By leveraging appropriate processing techniques and enzyme supplementation, the nutritional benefits of barley can be fully realized, supporting the growth, health, and productivity of monogastric animals.

Conclusions

The study on the nutritional evaluation of barley as feed for monogastric animals has provided valuable insights into its chemical composition and its potential benefits as a feed ingredient. Barley exhibits a well-balanced nutrient profile, with significant levels of crude protein, ether extract, and crude fiber. The high nitrogen-free extract (NFE) content indicates that barley is an excellent source of carbohydrates, providing a substantial amount of energy necessary for the animals' metabolic functions. The crude protein content of barley meets the dietary protein requirements of monogastric animals, reducing the need for additional protein supplements. This makes barley a cost-effective and efficient protein source. The metabolizable energy (ME) content of barley is adequate to support the energy needs of monogastric animals.

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