



(RESEARCH ARTICLE)



Use of Georgian non-genetically modified plant ingredients for the production of the dog food brand “Bombora”

Vasil Ghlighvashvili, Edisher Kvesitadze, Temuri Rukhadze and Ana Korsantia *

Faculty of Agrarian Sciences and Biosystems Engineering, Animal Husbandry, Georgian Technical University, Georgia.

International Journal of Science and Research Archive, 2025, 16(02), 1602-1606

Publication history: Received on 18 July 2025; revised on 24 August 2025; accepted on 26 August 2025

Article DOI: <https://doi.org/10.30574/ijrsra.2025.16.2.2477>

Abstract

In response to growing demand, Mars Inc. became the first company to launch a plant-based dog food line, KARMA, in June 2021. KARMA recipes incorporate ingredients such as flaxseeds, desiccated coconut, chia seeds, dried pumpkin, cabbage, and others-alongside chicken or white fish-complemented by traditional grains like corn, wheat, and oats.

Georgia is no exception to this global trend. As the country aligns itself with European principles of food safety and public health-particularly in light of its new status as a candidate for European Union membership-regulations regarding both human food and animal feed are becoming increasingly stringent. It is also noteworthy that Georgia’s dog food market is dominated by foreign-made products, with domestically produced food representing only a small fraction. This presents a missed economic opportunity for the country.

Consequently, the development and production of high-quality dog food using local ingredients have become an important goal. After an in-depth analysis, a new dog food brand-“Bombora”-was created using non-GMO, high-quality grains produced in Georgia. Simultaneously, plant-based alternatives to synthetic antibiotics and growth stimulants were explored. Based on both local phylogenetic resources and global research, edible pumpkin, sugar beet, and astilbe were selected as herbal feed additives.

The quality and safety of the new product are confirmed by the fact that, in 2022, LANCER LLC launched commercial production of “Bombora” and received ISO 22000 certification.

Keywords: Holistic Health; Canine; Dog Food; Herbal Supplement

1. Introduction

In recent years, the European Union’s “One Health” approach has elevated the importance of animal nutrition within the agricultural sector. Many European countries have banned synthetic additives (e.g., antibiotics, growth hormones) and genetically modified ingredients in animal feed. Alongside livestock production, increasing attention is being paid to the nutrition of companion animals.

According to the American Pet Products Association, between 2019 and 2020, 67% of U.S. households owned a pet, with dogs accounting for approximately 83.3 million pets. Dog food constitutes 71% of all pet food sales in the U.S. In 2023, the global dog food market was valued at \ \$61.46 billion and is projected to grow to \ \$76.95 billion by 2028. Premium pet food-distinguished by its natural, organic composition and higher quality-is in rising demand. In response, manufacturers are innovating to meet consumer expectations. For instance, in 2020, China’s Fwusow Industry Co. launched a dog food line containing OxC-beta, a compound that boosts immunity without relying on antibiotics. While

* Corresponding author: Ana Korsantia

pain management dominated the pet wellness sector in the past, recent trends emphasize weight control, skin care, and digestive health. Obesity in pets is now a major concern, further fueling demand for nutritious, functional pet foods. Dog food is classified by product type (dry, wet, therapeutic diets, treats) and ingredient source (animal-based, plant-based, grains, insects, etc.). In line with these developments, Mars Inc. introduced the plant-forward KARMA line in 2021, combining cereals and plant-based ingredients with animal protein.

Georgia mirrors these international shifts. Given its alignment with EU food safety norms, the local market is expected to adopt stricter standards. Despite this, domestically produced dog food remains marginal, posing a challenge to national economic development. This underscores the urgency of fostering local production with high-quality, native ingredients.

2. Materials and Methods

In recent years, efforts have been made to develop local dog food tailored to the Georgian market. LANCER LLC initiated collaboration with Professor V. Ghlighvashvili from the Georgian Technical University's Faculty of Agricultural Sciences and Biosystems Engineering.

- High-quality dry dog food typically contains
- Proteins (30-45%): meat, fish, poultry meal, dried meat
- Carbohydrates (20-30%): rice, wheat flour, vegetable protein isolates, mixed ground grains
- Fats (17-23%): olive oil, sunflower oil, linseed oil, fish oil, animal fats
- Fiber (11-15%): vegetables, cellulose, sugar beet pulp

Following comprehensive analysis, the "Bombora" brand was established, featuring high-quality, non-GMO Georgian grains. In parallel, suitable plant-based ingredients were identified to replace synthetic antibiotics and stimulants. Edible pumpkin, sugar beet by-products, and beetroot were selected as core supplements based on international practices.

- Edible pumpkin (*Cucurbita maxima* L.) is rich in vitamins A, C, E, B-complex, K (important for blood clotting), and T (aids digestion and helps prevent obesity).
- Sugar beet by-products (*Beta vulgaris*) are rich in bioactive compounds after sugar extraction. The remaining fiber, amino acids, and minerals enhance liver health, support cholesterol metabolism, and aid digestion.

3. Results

In order to develop the formulation and determine the appropriate quantities of ingredients, a biochemical analysis was carried out. The results demonstrated the high nutritional value of the components. (Tables 1).

(Laboratory studies were conducted in the biochemical laboratory of the Faculty of Agrarian Sciences and Biosystems Engineering, Georgian Technical University)

3.1. Chemical Composition of Fodder Turnip and Sugar Beet

(Values are per 100 g of fresh product)

Table 1 Chemical Composition

Component	Fodder Turnip	Sugar Beet
Moisture (%)	87-91	74-81
Dry Matter (%)	11-15	19-26
Total Sugars (%)	5-11 (glucose, fructose)	15-21 (sucrose)
Crude Fiber (%)	0.9-1.6	0.6-1.1
Crude Protein (%)	1.1-2.1	1.1-1.6
Ash (%)	1.0-1.2	0.8-1.0

Table 2 Mineral Content (mg per 100 g)

Element	Fodder Turnip	Sugar Beet
Calcium (Ca)	182-251	14-26
Phosphorus (P)	42-61	31-41
Magnesium (Mg)	21-32	21-31
Potassium (K)	233-306	252-407
Sodium (Na)	19-31	-
Iron (Fe)	0.6-1.1	0.7-1.1
Manganese (Mn)	0.2-0.5	0.2-0.4
Zinc (Zn)	0.3-0.7	0.2-0.6
Copper (Cu)	0.06-0.09	0.04-0.08
Iodine (I)	5-6 µg	-
Boron (B)	-	~2-5

Table 3 Amino Acids Content (mg per 100 g)

Amino Acid	Fodder Turnip	Sugar Beet
Lysine	81-121	59-101
Methionine	21-29	19-27
Threonine	51-62	41-61
Valine	71-92	62-81
Isoleucine	49-62	46-61
Leucine	91-110	86-100
Arginine	61-81	51-72
Glutamic Acid	201-252	182-221

4. Methodologies Used in the Analysis of Fodder Turnip and Sugar Beet

The following internationally recognized ISO methods were applied in the chemical analysis of fodder turnip and sugar beet. These methods ensure accuracy and comparability in assessing moisture, crude ash, protein, fiber, sugars, minerals, and amino acid content.

Table 4 The analyses were conducted using standardized methodologies, including those in accordance with ISO guidelines

Parameter	ISO Method	Description
Moisture / Dry Matter	ISO 6496:1999 / ISO 712	Gravimetric method, drying at 103°C
Crude Ash	ISO 5984:2002	Ashing in a muffle furnace at 550°C
Crude Protein (Kjeldahl)	ISO 5983-1:2005	Total nitrogen determination by Kjeldahl method
Crude Fiber	ISO 6865:2000	Weende method: acid-alkali digestion
Soluble Sugars	ISO 14332:2018 / ISO 22113:2021	Determination by HPLC after sample extraction

Macro Minerals (Ca, P, Mg, K, Na)	ISO 6491:1998	Spectrometry after dry ashing and acid digestion
Trace Minerals (Fe, Mn, Zn, Cu, etc.)	ISO 6869:2000	Atomic absorption spectrometry (AAS)
Amino Acids	ISO 13903:2005	Acid hydrolysis followed by HPLC determination

Due to the proprietary nature of the “Bombora” recipe, only general nutritional data is presented

4.1. Nutritional Value of the Developed Pet Food (per 100 g of product)

Table 5 Nutritional Value (per 100 g)

Component	Value
Protein	8.1 g
Fat	3.7 g
Ash	2.0 g
Cellulose (Fiber)	0.21 g
Moisture	82 g
Vitamin A	Not less than 130 IU
Vitamin E	Not less than 1.15 mg
Energy Value	71 kcal

Here is the professionally edited version of your English academic text. The edits improve clarity, grammar, structure, and formal tone while preserving the original meaning

A trial batch was produced by LANCER LLC and tested at the “Legion” hunting club with 370 dogs from various breeds and work profiles (retrievers, pointers, spaniels). The dogs enthusiastically consumed the feed, remained energetic during hunting season, and maintained optimal condition during off-seasons without becoming overweight.

4.2. ISO 22000 Certificate – “Bombora” Brand



Figure N1 ISO 22 000 Certificate

Based on these outcomes, full-scale production was launched. A facility was established to meet quality standards, and in 2022, LANCER LLC's "Bombora" received ISO 22000 certification, confirming the safety and quality of its production process.

5. Conclusion

- The findings demonstrate the feasibility of producing premium dog food in Georgia using non-GMO, high-quality plant-based raw materials. In addition to common crops, local wild herbs enhance nutritional value and allow the substitution of synthetic additives with natural bioactive compounds-aligned with global health trends.
- Continued research is essential to further enrich dog food with easily absorbable micro-and macro-elements from plant sources.
- It is especially important to develop formulations based on local resources that naturally replace chemical antibiotics and stimulants-key to advancing the "holistic health" paradigm.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict-of-interest to be disclosed.

References

- [1] D. Gurgenzidze, V. Ghlighvashvili, T. Kacharava. Bioresources and Prospects of Green Construction in Georgia, Monograph, GTU, 2022. ISBN 978-9941-16-823-9, 428 p.
- [2] Luciano Trevizan, Anna K. Shoveller. (2023) - Nutrition and management of animals we keep as companions, *Frontiers in Veterinary Science*, *Front.Vet.Sci.*10:1348594, DOI: 10.3389/fvets.2023.1348594
- [3] Kumar R, Sharma A. Emerging innovations in pet food industry, sustainability, nutrition and consumer trends in 2024. *Bulletin of Almaty Technological University*. (2024) - 146(4):132-139. DOI:10.48184/2304-568X-2024-4-132-139.
- [4] Aleksidze A, Japaridze G, Giorgadze A, Kacharava T. (2018) - Biodiversity of Georgia, *Global Biodiversity, Volume 2, Selected Countries in Europe Environmental Science/Climate Change and Mitigation*, ISBN: 9781771887175, 404 p.
- [5] Korakhashvili A., Kacharava T., (2018) - Catalog of Medicinal, Aromatic, Spiciness and Poisonous Herbs of Georgia (Latin, Russian, Georgian, English) ISBN 978-5-93728-090-9, Moscow, 79 p.
- [6] Kacharava T., Epitashvili T. (2020) - Physiological and Chemical Characteristics of Lemon Balm (*Melissa Officinalis*) in Georgia, *Journal of Research and Opinion, JRO*, 7(1), 2618-2621(2020), ISSN (O): 2589-9058 , ISSN (P): 2589-904-X, DOI: 10.15520/jro.v7i1.46.
- [7] Banton, S., Baynham, A., Pezzali, J. G., von Massow, M., and Shoveller, A. K. (2021). Grains on the brain: A survey of dog owner purchasing habits related to grain-free dry dog foods. *PLOS ONE*, 16(5). DOI: 10.1371/journal.pone.0250806
- [8] Xinzi Wang, Yifei Wang. (2024) - The Role of Plant Extracts in Enhancing Nutrition and Health for Dogs and Cats: Safety, Benefits, and Applications, *Veterinary science*, DOI:10.3390/vetsci11090426.
- [9] Umut Burak Agan, Seba Hosseinpour Raouf. (2022) - The Hidden Potential of Herbal Remedies and Nutraceuticals in Canine and Feline Behavioral Disorders, *Van Vet Journal* 2022, 33 issue (1) 36-41p. ISSN:2149-3359, e-ISSN:2149-8644, DOI:10.36483/vanvetj.955081.
- [10] Gautier Le Guillas, Pascal Vanacher. (2024) - Insights to Study, Understand and Manage Extruded Dry Pet Food Palatability, *Animals*, 14 (7), DOI:10.3390/ani14071095.