NUTRITIONAL AND ECONOMIC ASPECTS OF BONE BROTH PRODUCTION FROM LOCAL LIVESTOCK SOURCES IN ALBERTA, CANADA

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Abstract. This study explores the nutritional, economic, and practical aspects of bone broth production using locally sourced beef, bison, pork, and chicken bones in Alberta, Canada. The research aimed to evaluate bone broth as an affordable source of protein and collagen, as well as its potential as a sustainable alternative to industrial collagen supplements. The experiential approach involved recipe standardization, sensory evaluation, and cost analysis.

Results indicate that locally prepared bone broth can provide 5–9 grams of protein per serving, with significant amino acid content (glycine, proline, hydroxyproline). Although the cost per gram of protein remains higher than commercial collagen powders, bone broth offers complete nutritional value and supports community-based food systems. The findings highlight bone broth's potential role in food security, waste reduction, and value-added meat processing, providing opportunities for local farmers and small producers.

Keywords: Bone broth, collagen, food processing, local production, Alberta

Introduction. This article investigates the development of affordable, nutritious, and locally sourced food products using animal bones that are often underutilized in modern food systems. The study aims to demonstrate how bone broth can provide both economic and nutritional value while enhancing local food resilience and supporting small-scale producers.

Materials and Methods. The experiential study was conducted during the winter of 2024-2025 in Olds, Alberta. Locally sourced beef, bison, pork, and chicken bones were processed using slow-cooking and acid-assisted extraction methods. Recipe iterations included variations in temperature (70°C-95°C), time (12-24 hours), and acid type (acetic, lactic, citric). Community sensory evaluations were used to assess flavour and quality. Cost analysis compared broth protein yield to commercial collagen supplements.

Results. According to nutritional tables, bone broth contains 5–9 grams of protein in 250 ml of broth. Collagen content was influenced by cooking duration and bone type, with knuckle and femur bones yielding the highest levels. The cost per equivalent protein unit was higher than that of supplements, but it offered complete nutrition and versatility. Process efficiency improved through batch scaling and the use of professional-grade stock pots.

Discussion. The study confirms that bone broth provides meaningful nutritional benefits while promoting sustainable use of local livestock by-products. It bridges traditional culinary knowledge and modern dietary needs. From an economic perspective, small-scale production can support diversification for farmers and enhance food security through value-added processing.

Conclusion. Bone broth production using locally sourced animal bones presents a viable path toward sustainable, nutritious, and community-based food systems. Further research should investigate nutrient retention under various processing methods and explore commercial-scale production models.

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Savoring the benefits of bone broth: Worth a taste? https://www.health.harvard.edu/nutrition/savoring-the-benefits-of-bone-broth-worth-a-taste Harvard Health March 04, 2025.

Анотація. Дослідження присвячено вивченню харчової, економічної та практичної цінності виробництва бульйону з кісток із місцевих джерел яловичини, бізона, свинини та курятини в Альберті, Канада. Метою було оцінити бульйон з кісток як доступне джерело білка та колагену, а також як сталу альтернативу промисловим колагеновим добавкам.

Експериментальне дослідження включало стандартизацію рецептур, сенсорну оцінку та аналіз собівартості. Результати показали, що локально приготовлений бульйон забезпечує 5–9 грамів білка на порцію з високим вмістом амінокислот (гліцин, пролін, гідроксипролін).

Хоча собівартість граму білка вища, ніж у комерційних порошках колагену, бульйон з кісток має повну харчову цінність і підтримує розвиток локальних продовольчих систем. Отримані результати підкреслюють потенційну роль бульйону з кісток у підвищенні продовольчої безпеки, зменшенні відходів та створенні доданої вартості для місцевих фермерів і переробників.

Ключові слова: Бульйон з кісток, колаген, переробка продуктів, локальне виробництво, Альберта.

ADDENDUM: STANDARDIZED BONE BROTH RECIPES

Recipe 1 – European Bone Broth

Standardized ratio: 500 g of bones per 1 L of water.

Ingredients: Bison and beef knuckle bones, chicken feet or pork hocks (feet), apple cider vinegar or lemon juice (1 tablespoon per 500 g of bones).

Essential and Optional Herbs: Laurel leaves, one peeled onion, 2–3 garlic cloves, carrots or parsnip, celery, parsley or dill stems, ginger. Essential herbs in European broth are mild and suitable for children.

Vegetarian Option: Replace meat bones with dried mushrooms.

Additional Ingredients (Optional): Can be added to the strained broth for soup preparation or during cooking: carrots, salt or soy sauce (or replace with dried scallops or crawfish for more minerals and less sodium), pepper, nutmeg, cloves (tiny amount), green onions, parsley, or dill.

Recipe 2 – Traditional Chinese Medicine (TCM) Bone Broth

Based on the Si Shen Tang herbal formula.

Function: The traditional Chinese formula supports adrenal function, digestion, and stress relief. It calms the heart and mind, nourishes the spleen, and promotes restful sleep.

Always consume warm. The formula is mild and suitable for children.

Ingredients: Bison knuckle bones, pork feet bones, chicken feet (500 g of bones per 1 L of water), Shaoxing wine or apple cider vinegar (1 tablespoon per 500 g of bones).

Herbal Additions: Chinese yam rhizome (Shan Yao / Huai Shan, 山药 / 淮山), lotus seed (Lian Zi, 莲子), fox nuts (Qian Shi, 芡实), poria (Fu Shen, 茯神).

Vegetarian Option: Replace meat with dried mushrooms.

Additional Ingredients (Optional): Can be added to strained broth for enhanced flavour and nutrition: carrots, salt or soy sauce (or replace with dried scallops or crawfish for more minerals and less sodium), pepper, onions, candied dates, green onions, or dill.

ADDENDUM: METHOD OF COOKING BONE BROTH

Choose the marrow, knuckle and feet bones of animals. Add meat bones if you like meat in the soup base.

Put all bones into a large pot, cover with water and bring to a boil.

Rinse the herbs, pour hot water over the dried herbs and let them sit till the bones are ready.

Boil the bones for about 10 min for the foam to come to the top.

Discard water, rinse the bones to clean them of the remaining foam (no need to scrub).

Put the bones and herbs into a pot, a slow cooker or an Instant Pot and pour enough water to cover the bones. If using a pot and a stove - bring to a simmer and keep it simmering for 20 hours. If using a slow cooker or pressure cooker, set the temperature to Slow Cook for 20 hours.

Take out the bones

Sieve the broth into a clean pot

Add meat from the bones into the broth.

TCM herbs can be eaten. Euro herbs need to be discarded.

You can add spices or cut vegetables to the sieved broth and meat. Bring it to a boil again if adding new uncooked ingredients.

When the broth cools down, you can take the fat out from the top or leave it in for heartier meals.

Pack the cooled broth into containers and keep it in the refrigerator or freezer.

When using broth for cooking, always warm it to at least 65 degrees.