Pork meat and ketogenic diets: nutritional, metabolic, and cardiovascular perspectives

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Abstract. This mini-review examines the intersection between pork consumption and ketogenic diets (KDs), with a particular focus on nutritional composition, metabolic effects, and cardiovascular implications. Pork represents a significant source of high-quality protein, essential micronutrients, and variable lipid profiles, which are influenced by factors such as breed, feeding practices, and processing methods. Concurrently, KDs—characterized by high fat and very low carbohydrate intake—have gained attention for their efficacy in weight management and metabolic control, especially in individuals with obesity and type 2 diabetes mellitus (T2DM). The available literature suggests that while KDs can improve glycemic control, lipid profiles, and body composition, their cardiovascular outcomes remain context-dependent, particularly in relation to fat quality and dietary composition. Lean, unprocessed pork appears to integrate more favorably into ketogenic frameworks due to its lower saturated fat and sodium content, whereas processed pork products are consistently associated with increased cardiovascular risk and mortality. Furthermore, the metabolic benefits of KDs are often strongly linked to energy restriction and weight loss rather than ketosis per se. Overall, this review highlights that the health impact of pork within KDs depends on multiple interacting factors, including meat processing, fatty acid composition, dietary pattern quality, and energy balance. The current evidence does not support a uniform characterization of pork-based KDs, underscoring the need for more targeted research in this area.
Keywords: ketogenic diet, pork meat, cardiovascular risk, saturated fatty acids, metabolic health, processed meat, lipid profile, obesity, type 2 diabetes mellitus, dietary patterns.

Introduction. Pork is a major global source of high-quality animal protein and fat, while ketogenic diets (KDs) are high-fat, very-low-carbohydrate regimens increasingly used for weight and metabolic control. The intersection of these topics concerns how pork's nutrient profile fits into high-fat dietary patterns such as KDs and what this may imply for cardiometabolic health. The available research connects pork composition, meat processing, saturated fat quality, and KD metabolic effects but does not directly study "pork-based KDs" as a distinct intervention.

The aim of this mini-review is to critically synthesize current scientific evidence regarding the nutritional, metabolic, and cardiovascular implications of pork consumption within the context of KDs. Specifically, the study seeks to: (i) evaluate the compositional characteristics of pork relevant to high-fat dietary regimens; (ii) examine the metabolic and clinical effects associated with KDs; and (iii) assess how different forms of pork—particularly lean versus processed—may influence cardiometabolic outcomes when incorporated into such dietary patterns. Through this integrative approach, the review aims to clarify the extent to which pork can be considered compatible with health-oriented ketogenic strategies.

Pork Composition, Meat Quality and Health Implications. Fresh pork provides high-biologic-value protein, B-complex vitamins, and essential minerals (iron, zinc), with moderate saturated fat compared with beef (Vicente & Pereira, 2024). Fatty acid profiles vary substantially by breed, age, intramuscular fat (IMF) level and cut; main fatty acids include palmitic (C16:0), stearic (C18:0), oleic (C18:1n9c) and linoleic (C18:2n6c) (Duan et al., 2022; Vicente & Pereira, 2024; Fuping et al., 2025; Wen et al., 2025). Increasing IMF is positively correlated with many fatty acids and can improve n-6/n-3 ratios and essential PUFA content, potentially enhancing nutritional value (Fuping et al., 2025). Pork flavor and quality are strongly influenced by amino acid composition, especially umami amino acids and flavor-related amino acids (alanine, aspartate, glutamate) (Duan et al., 2022; Liao et al., 2024; Wen et al., 2025).

Clinical data reviewed for pork as part of overall diet show no consistent harmful effects on blood lipids when lean, unprocessed pork is consumed in controlled settings (Vicente & Pereira, 2024). However, broader cardiovascular reviews associate higher red and processed meat intake (not pork-specific) with increased the cardiovascular disease (CVD) risk, especially within Western patterns high in saturated fat, sodium, and refined carbohydrates (Rohrmann & Linseisen, 2015; Campbell, 2019; Perna & Hewlings, 2022; Chen et al., 2023). Processed meats (sausages, bacon, ham), often pork-based, add salt, nitrite, and processing-related contaminants; multiple cohort meta-analyses link high processed meat consumption to higher all-cause and CVD mortality and colorectal cancer (Rohrmann & Linseisen, 2015). Large US survey data (NHANES 1999–2016) show processed meat intake has remained stable, while unprocessed red meat declined and poultry increased (Zeng et al., 2019).

Pork Nutrient Profile, Fat Quality and Cardiovascular Context. Saturated fatty acid (SFA) chain length modulates CVD associations: long-chain SFA (C12–C18, largely from meat and cheese) trend toward higher CVD risk, whereas short-/medium-chain SFA (C4–C10) appear neutral or possibly beneficial (Perna & Hewlings, 2022). Replacement matters: substituting SFA with refined carbohydrates or additional meat protein worsens risk, while replacement with plant protein, PUFA, MUFA, or complex carbohydrates reduces or neutralizes risk (Perna & Hewlings, 2022; Chen et al., 2023). Reviews on animal vs plant protein emphasize that lean, unprocessed red meat (including lean pork) can provide dense, high-quality protein with relatively low saturated fat and sodium, whereas fatty, processed pork products (e.g., sausage) can be extremely high in both (up to ~39 g SFA and 775 mg sodium per 3-oz sausage vs ~1 g SFA and 48 mg sodium in trimmed pork tenderloin) (Rohrmann & Linseisen, 2015; Campbell, 2019). Table 1 summarizes key pork-related nutritional distinctions relevant to ketogenic patterns.

Table 1

Nutritional contrasts among pork types and CVD risk

Aspect	*Lean unprocessed pork (e.g., tenderloin)*	*Fatty/processed pork (e.g., sausage, bacon)*	*Citations*
Protein quality	High, complete amino acid profile	High, often similar	Campbell, 2019; Liao et al., 2024; Vicente & Pereira, 2024
Saturated fat	Moderate; can be low when trimmed	Often very high per portion	Rohrmann & Linseisen, 2015; Campbell, 2019; Perna & Hewlings, 2022; Vicente & Pereira, 2024
Sodium & additives	Low sodium; minimal additives	High sodium, nitrite, smoke products	Rohrmann & Linseisen, 2015; Campbell, 2019; Zeng et al., 2019
Observational link to CVD	No clear excess risk when unprocessed and lean	Consistent association with higher CVD and mortality	Rohrmann & Linseisen, 2015; Campbell, 2019; Zeng et al., 2019; Perna & Hewlings, 2022; Chen et al., 2023;

Genetic and nutritional management of pigs can alter IMF, MUFA/PUFA ratios, and n-6/n-3 proportions, with higher IMF often accompanied by increased oleic acid and improved PUFA balance (Duan et al., 2022; Fuping et al., 2025; Wen et al., 2025; Tang et al., 2026). These findings support the possibility of breeding and feeding strategies to produce pork better aligned with cardiometabolic goals (Duan et al., 2022; Liao et al., 2024; Fuping et al., 2025; Wen et al., 2025; Tang et al., 2026).

Ketogenic Diets: Metabolic Effects, Mechanisms and Cardiovascular Markers. Randomized controlled trials and meta-analyses indicate that KDs in people with overweight/obesity and especially type 2 diabetes mellitus (T2DM) substantially improve glycemic control and several lipid parameters compared with higher-carbohydrate or low-fat diets. Systematic reviews report reductions in fasting glucose (~1.3 mmol L^{-1}), HbA1c (~1.0 percentage point), triglycerides, total cholesterol, and LDL, with increases in HDL and marked reductions in body weight, waist circumference and BMI in T2DM populations (Choi et al., 2020; Yuan et al., 2020; Zhou et al., 2022). Meta-analyses focused on overweight T2DM patients show significant weight loss, decreased waist circumference, reduced HbA1c and triglycerides, and higher HDL compared to control diets (Choi et al., 2020; Zhou et al., 2022). Another synthesis in obese populations reports significant reductions in glucose and triglycerides but a rise in LDL cholesterol, with no clear additional BMI benefit versus comparison diets (Putri & Weta, 2025). A narrative review similarly concludes that KDs generally lower TG and increase HDL, with mixed effects on LDL depending on context (Ahmad et al., 2024; Chávez-Alfaro et al., 2025).

The mechanistic review of KD metabolism highlights a shift from carbohydrate to fat and ketone oxidation, leading to lower triglycerides and sometimes total cholesterol, increased HDL, and improved dyslipidemia, while promoting loss of fat mass via altered adipose tissue hormones and browning of white adipose tissue (Ahmad et al., 2024). Ketosis (via β-hydroxybutyrate) can modulate gene expression and epigenetic pathways, potentially influencing systemic metabolism and inflammation (Chávez-Alfaro et al., 2025; Ahmad et al., 2024). KD also affects the gut microbiome and may improve visceral adiposity and appetite control (Ahmad et al., 2024; Chávez-Alfaro et al., 2025).

However, at least one controlled trial demonstrates that when energy intake and body weight are strictly maintained, a weight-maintaining KD (with or without exogenous ketone ester) in obese T2DM subjects does not improve glucose tolerance, insulin sensitivity, lipid profile or blood pressure over 10 days, despite clear shifts toward increased fat oxidation and elevated ketone levels (Merovci et al., 2024). This suggests that many clinical benefits attributed to KDs may be mediated primarily by energy restriction and weight loss, rather than ketosis per se (Choi et al., 2020; Yuan et al., 2020; Ahmad et al., 2024; Merovci et al., 2024).

Dietary Patterns, Meat, and Cardiovascular Risk in the Context of Ketogenic Diets. Cardiovascular reviews emphasize that diet quality and overall pattern are critical. High intake of saturated fat, sugar-sweetened beverages, red and processed meat, and salt is associated with greater CVD risk, whereas higher intakes of plant-based foods, dietary fiber, nuts, fruits, and vegetables are protective (Chen et al., 2023). Mediterranean-style patterns, typically lower in red/processed meat and emphasizing plant fats (olive oil), nuts, and fish, show strong evidence for CVD prevention (Chen et al., 2023; Chávez-Alfaro et al., 2025). An ongoing Mediterranean intervention that removes red and processed meat and lowers saturated fat in adults with dyslipidemia is designed to improve LDL-cholesterol and fatty acid profiles, illustrating how reducing such meat within a high-quality pattern is being operationalized in contemporary trials (Perna & Hewlings, 2022; Liao et al., 2024; Chávez-Alfaro et al., 2025).

Ultra-processed foods, many of which include processed pork (sausages, bacon, ham, deli meats), are independently associated with higher risks of total CVD, coronary heart disease, and cerebrovascular disease in large French cohort data, even after adjusting for classical nutritional markers such as saturated fat, sodium, sugar, and fiber (Rohrmann & Linseisen, 2015; Srour et al., 2019; Zeng et al., 2019). These findings suggest that degree of processing and non-nutrient components (additives, contaminants) also matter for cardiovascular health (Rohrmann & Linseisen, 2015; Srour et al., 2019).

KD implementations in practice frequently rely on animal-derived fats and proteins, often from red and processed meats, cheese and eggs, though the reviewed KD studies do not systematically quantify pork intake (Choi et al., 2020; Yuan et al., 2020; Zhou et al., 2022; Merovci et al., 2024; Ahmad et al., 2024; Chávez-Alfaro et al., 2025; Putri & Weta, 2025). The broader cardiovascular literature suggests that the cardiometabolic risk profile of a KD will depend not only on macronutrient ratios but also on:

1. The types of fat (unsaturated vs long-chain SFA; source from meat vs plant oils and fish) (; Campbell, 2019; Perna & Hewlings, 2022; Chen et al., 2023; Ahmad et al., 2024).
2. The degree and type of meat processing (lean unprocessed vs processed/high-sodium pork) (Rohrmann & Linseisen, 2015; Campbell, 2019; Zeng et al., 2019; Chen et al., 2023; Vicente & Pereira, 2024).
3. The plant content of the KD (fibers, nuts, low-carb vegetables), which can counterbalance some adverse effects (Srour et al., 2019; Chen et al., 2023; Ahmad et al., 2024; Chávez-Alfaro et al., 2025).
4. The weight-loss vs weight-maintaining context, given that many favorable KD effects are tightly linked to energy deficit (Choi et al., 2020; Yuan et al., 2020; Ahmad et al., 2024; Merovci et al., 2024; Putri & Weta, 2025).

In this framework, lean, minimally processed pork can theoretically function as a source of high-quality protein and fat within a KD, particularly if accompanied by favorable fatty acid composition (higher MUFA/PUFA, better n-6/n-3 ratios) (Campbell, 2019; Duan et al., 2022; Vicente & Pereira, 2024; Fuping et al., 2025; Ma et al 2025; Wen et al., 2025). In contrast, routine inclusion of processed pork products rich in long-chain SFA, sodium, and processing-derived compounds would align more closely with dietary patterns associated with higher CVD risk (Rohrmann & Linseisen, 2015; Campbell, 2019; Srour et al., 2019; Zeng et al., 2019; Perna & Hewlings, 2022; Chen et al., 2023).

Conclusions. The relationship between pork consumption and KDs is complex and highly dependent on qualitative dietary factors rather than macronutrient distribution alone. Evidence indicates that KDs can produce significant improvements in metabolic parameters, particularly in populations with obesity and type 2 diabetes; however, these benefits are frequently mediated by caloric restriction and weight loss rather than ketosis itself.

Within this framework, the type and processing level of pork are critical determinants of health outcomes. Lean, unprocessed pork may serve as a nutritionally valuable component of KDs, providing high-quality protein and a relatively favorable lipid profile when appropriately selected. In contrast, frequent consumption of processed pork products, characterized by high levels of saturated fats, sodium, and additives, is consistently associated with increased cardiovascular risk and adverse health outcomes.

Importantly, the broader dietary context, including fat sources, plant food intake, and overall diet quality, plays a decisive role in modulating the effects of KDs. Consequently, the integration of pork into such dietary patterns should be approached with consideration of these factors. Future research should focus on well-controlled studies specifically investigating pork-based ketogenic dietary models to better elucidate their long-term health implications.

Acknowledgements. This mini-review presents a synthesis of findings and conclusions drawn from the existing literature and does not reflect the authors' own stance regarding the nutritional value or the implications for human health of pork as a food item.

Moreover, the first author's personal practical outcomes, particularly in the domains of high-performance sport at advanced ages, obesity management, and the maintenance of health in later life, have shaped a set of individual convictions in favor of pork consumption. These convictions are situated within the framework of a higher-protein, lower-carbohydrate dietary pattern, which, from our perspective, may be optimally represented by either ketogenic or generally low-carbohydrate diets.

Our practical experience does not fully align with the evidence currently available in the scientific literature (see similar opinions in Safirescu 2021; Criste et al 2017).
An AI-powered search engine for research - https://consensus.app – Consensus NLP, Inc – was used to summarize data in a table.

Authors Contributions. CLC and BM wrote the manuscript; DB read and revised the manuscript.

Conflicts of Interest. The authors declare that there is no conflict of interest.

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