

Children and adults should avoid consuming animal products to reduce the risk for chronic disease: Debate Consensus

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ABSTRACT

The present debate outlined opposing views regarding the role of animal products in human diets. The YES position argues that the health benefits and safety of plant-based diets have been clearly established by consistent findings of randomized trials and observational studies; that animal products skew the diet toward saturated fat, excess protein, cholesterol, lactose, and exogenous hormones; and that vulnerable populations are better nourished by vegetables, fruits, legumes, and whole grains than by striated muscle and cow milk. In contrast, the NO position asserts that animal foods are not only benign but are also key elements of the human omnivore diet, facilitating the global challenge of adequate essential nutrition. This view holds that the portrayal of animal foods as unhealthy is not supported by the evidence and that a restrictive vegan diet decreases nutritional flexibility and robustness, increasing risk for vulnerable population groups. Points of agreement and controversy were identified, as well as opportunities for further studies. *Am J Clin Nutr* 2020;112:937–940.

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For Dr. Barnard, who presented the YES argument, the prospect of the debate seemed at first to be an unnecessary re-examination of well-established knowledge about health benefits and nutrient adequacy of plant-based diets (1) while, reminiscent of the Dietary Guidelines Advisory Committee's experience in 2015, steering clear of urgent questions about agriculture-related climate effects, pollution, and animal mistreatment for reasons of space.

In making his scientific case, Dr. Barnard argued that a robust body of well-controlled clinical trials has established the health benefits, safety, and nutritional superiority of plant-based diets for key cardiometabolic endpoints, confirming the findings of observational studies, which have also suggested additional benefits for cancer prevention and longevity (1–5). He further argued that the addition of animal products skews the diet toward an unnecessarily high content of saturated fat, protein,

cholesterol, lactose, and exogenous hormones, while displacing fiber and vitamins. He noted that saturated fat, derived primarily from animal products in typical prevailing patterns, increases plasma cholesterol and is associated with cardiovascular disease and Alzheimer disease (6).

Having discussed the interrelationships with environmental and ethical complexities elsewhere (7, 8), Dr. Leroy, who presented the NO argument, welcomed a discussion focused on health aspects, especially in light of persisting controversies. He emphasized that humans are naturally omnivores, not herbivores (9), and that animal foods have long been consumed by all human societies, serving as valuable dietary components that meet a variety of biosocial needs (10). He argued that exclusion of all animal foods would undermine nutritional flexibility and robustness, placing some of the more vulnerable population groups at increased risk.

Dr. Leroy emphasized that animal foods are benign and evolutionarily appropriate foods containing nutrients that are not easily obtained from plants (11). He argued that the nutritional case portraying animal foods as unhealthy is not supported by the evidence, especially from clinical trials. He built on the concept of adequate essential nutrition, physiological plausibility, and skepticism related to the causal interpretations of culturally contingent epidemiological associations. As such, Dr. Leroy offered a divergent perspective on evolutionary and biological anthropology, the role and nature of physiological and metabolic mechanisms (for instance, related to saturated fat), and standards of evidence for the construction and interpretation of nutritional data (12).

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This article series is designed as an Oxford-style debate. As such, participants are required to argue pro and con positions, even when that opinion may differ from their own. The views expressed in this debate do not necessarily reflect the opinion of the participants, *The American Journal of Clinical Nutrition*, or the American Society for Nutrition.

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Starting from these opposing positions, the authors came to an agreement on several key points, as summarized in **Box 1**, and identified points of ongoing disagreement, as summarized in **Box 2**. Importantly, they agreed on a way forward, as summarized in **Box 3**. Unanswered questions could be addressed by research studies comparing various formulations of omnivorous and vegan diets, while controlling for confounders as much as possible. Such studies should involve participants at a variety of stages of life and from a variety of demographic and cultural groups. Beyond body weight, lipids, and other cardiometabolic endpoints, research is needed to examine other health-related conditions, particularly cognitive, digestive, hormonal, and autoimmune diseases. While such research may not resolve discordant worldviews, ethical frameworks, and philosophical investments that have marked this debate, they may provide critical scientific data to inform policies, medical decisions, and individual food choices.

Box 1:

Points of agreement

- 1) Observational studies in North America, Europe, and Taiwan have reported that plant-based diets are associated with certain beneficial outcomes (e.g., lower body weights and a lower prevalence of diabetes), compared with omnivorous diets.
- 2) Dairy products, fatty meat, and eggs are major sources of saturated fat and dietary cholesterol.
- 3) Lactose maldigestion after infancy is the norm for adult mammals, including humans; however, some human populations have developed a genetic alteration providing lactose tolerance into adulthood.
- 4) Very high intakes of saturated fat or heme iron from animal products may have adverse health effects for certain predisposed subsets of the human population. (The health effects of more moderate intakes remain a topic of controversy, as per Box 2.)
- 5) Because plants lack vitamin B-12, people following vegan diets should use fortified foods or a vitamin B-12 supplement.
- 6) The value of plant foods can be diminished by adding ingredients that can be unhealthful in excess (e.g., sugar, frying oils) or removing healthful constituents (e.g., fiber).
- 7) Plant-based meals should be prepared using methods that avoid introducing contaminants or creating harmful substances.
- 8) Attention to diet quality (e.g., macro- and micronutrient sufficiency) is important on any diet to avoid adverse effects.

Box 2:

Continuing controversies

YES (Barnard)	NO (Leroy)
Is a vegan diet a healthful choice for everyone?	
<ul style="list-style-type: none">• Humans have no dietary requirement for striated muscle, animal milk, or eggs at any age, and we are better off without them.	<ul style="list-style-type: none">• Vegan diets are not for everyone; the success of any diet depends on interindividual variability, related to personal preferences, nutritional know-how, and biological differences (with respect to absorption, bioconversion, and metabolism).
Is the consumption of animal products inherently unhealthful?	
<ul style="list-style-type: none">• The inclusion of even moderate amounts of animal products in meals displaces healthful foods and the nutrients they provide, while introducing saturated fat, cholesterol, and an unnecessary protein load.	<ul style="list-style-type: none">• All potential benefits of plant foods can be derived from wholesome omnivore diets. The inverse does not hold, as the restrictive nature of vegan diets precludes the health benefits of animal foods.
Is it important to consider culinary traditions when making choices for health?	
<ul style="list-style-type: none">• The process of civilization is one of learning to not do certain things that we have come to realize are destructive to ourselves or others. Raising animals for slaughter is, for many reasons, clearly in that category.	<ul style="list-style-type: none">• Food is more than nutrients; omnivorous diets are part of our cultural heritage and valued as such, whereby animal foods offer additional diversity to the human diet on both a nutritional and culinary level.
Evolutionary appropriateness	
<ul style="list-style-type: none">• All great apes, including humans, are by nature predominantly or exclusively herbivores.• Human populations subsisting on hunting have been shown to be prone to cardiovascular disease.	<ul style="list-style-type: none">• All organisms thrive best on species-appropriate diets; humans are omnivores, evolutionarily adapted to the eating of substantial amounts of meat and fat.• Diseases of modernity were rare in ancestral populations who consumed diets based on meat (often at far higher levels than prevail today).
Biological effects of animal product components	
<ul style="list-style-type: none">• Saturated fat, derived predominantly from animal products, has adverse health effects even at levels of intake that might be considered moderate.	<ul style="list-style-type: none">• Saturated fat is a benign element of the human diet, present to some degree in most fat-containing foods irrespective of source.

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| <ul style="list-style-type: none"> ● Iron is best obtained in the nonheme form, as heme iron tends to foster iron overload, potentially contributing to cardiovascular and neurologic diseases. ● The annual impregnation of dairy cows to cause them to produce milk causes them to produce reproductive hormones that are detectable in milk and are associated with measurable health effects in dairy-consuming populations. Long-term exposure to dairy milk may increase risk for prostate and breast cancer. | <ul style="list-style-type: none"> ● Heme iron is a valuable nutrient that helps to both prevent and remedy iron deficiency, which remains a major international nutritional problem. ● The levels of natural hormones in milk and dairy products are not a health concern to humans. |
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- | Nutrient adequacy | |
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| <ul style="list-style-type: none"> ● Plant-based diets provide much better nutrition than animal-based diets. In communities where animal products are consumed to make up for highly skewed and deficient diets, these products create a wide variety of problems of their own. Nutrition policies should seek to remedy these food deficits with healthful vegetables, legumes, fruits, and whole grains, rather than muscle, milk, or eggs. ● Vegan diets are appropriate for people at all stages in life, including young and elderly persons. The inclusion of animal products can distort infant growth and pubertal development. ● A vegan diet easily provides adequate protein at any age. | <ul style="list-style-type: none"> ● Adequate essential nutrition to combat deficiencies at the population level remains a major challenge for public health globally and is best achieved by including animal foods. ● Vegan diets offer a less robust way to obtain adequate essential nutrition compared with healthy omnivore diets, especially for infants, optimal development during childhood, recovering patients, and healthy aging. ● Plant compared with animal protein provides lower biological value and anabolic responses, which can compromise nutritional adequacy. |
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- | State of the evidence and methodology | |
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| <ul style="list-style-type: none"> ● Epidemiological evidence is sufficiently consistent to support strong associations between meat avoidance and health benefits. Such studies are not intended for defining causality; that is the purpose of randomized trials. ● A robust body of randomized clinical trials shows that low-fat vegan diets improve body weight, plasma lipids, blood pressure, and glycemic control. ● Elevated LDL-cholesterol concentrations are associated with increased cardiovascular disease risk, and LDL particles are atherogenic, regardless of size. Interventions that increase HDL cholesterol do not reduce cardiovascular risk. | <ul style="list-style-type: none"> ● Epidemiological research suggesting adverse effects of red and processed meats suffers from confounding and bias and is not sufficiently rigorous to allow for causal interpretations. ● To the extent randomized clinical trials testing vegan diets have shown benefits, the comparison groups have typically not included an optimal omnivorous diet. ● More comprehensive biomarkers than LDL cholesterol are needed to characterize cardiometabolic risk, including type of LDL particles and triglyceride and HDL-cholesterol levels, and measures of glycemia and insulinemia. |

Box 3:**Research agenda to resolve debate**

- 1) Additional mid- to long-term randomized clinical trials, with factors other than diet kept as similar as possible, would be helpful to compare the nutritional and therapeutic effects of various subtypes of vegan and omnivorous diets at all stages of life and in a variety of demographic and cultural groups.
- 2) The comparative effects of vegan and omnivorous diets on outcomes beyond common cardiometabolic endpoints merit more investigation, particularly for specific subpopulations (e.g., infants, children, pregnant and lactating women, and the elderly). Outcomes of interest could include micronutrient intakes, nutrient status, and effects on physical, cognitive, psychiatric, digestive, hormonal, and autoimmune conditions.
- 3) Prospective observational studies and clinical trials should be adequately funded and executed with the highest possible standards for research quality, recognizing that more discussion is needed to agree on the best possible foundations for evaluating the quality of nutrition research.

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