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The Big Fat Comparison: Tallow, Butter, & Seed Oils as Culinary Options

Shelley A. Curry, Graduate Student

Dustin T. Yates, Associate Professor

University of Nebraska-Lincoln, Department of Animal Science

Tallow/lard, butter, and seed oils differ in origin, processing, heat stability, nutritional composition, and flavor, which makes each source suited for specific culinary uses. Understanding these differences, along with storage and availability considerations, help consumers make informed decisions that align with cooking methods, nutritional goals, cost considerations, and value-added opportunities.

Introduction

Fats are a culinary staple, contributing essential nutrients to the diet and playing important roles in flavor, texture, and cooking performance. Their use in the kitchen is ubiquitous and dynamic, from frying, baking, and sautéing dishes to preserving and processing foods. They are also key components of many value-added agricultural products, from the commercial shortening used by bakeries to soaps, waterproofing, and nutritional supplements for at-risk infants. Understanding how different fats are produced, how they respond to heat, their nutritional composition, and their shelf life (i.e., their ability to be stored) helps consumers, chefs, and agricultural producers make informed choices. This guide describes and compares among the three most commonly used categories of fats in the U.S.: tallow/lard, butter, and seed oils. It provides an evaluation of the culinary functionality, nutritional profile, storage characteristics, and long-term availability of each within the modern food system.

Figure 1. Lard produced from adipose tissue collected from pigs at harvest. Tallow is similarly produced from adipose tissue of beef cattle and lambs.

What Are These Fats & From Where Do They Come?

Tallow and lard. Tallow and lard are rendered animal fats produced from raw adipose tissue (i.e., bodyfat) obtained from the harvest of cattle and other food animals (**Figure 1**). The products are cleaned and slowly heated to separate the lipid component from the protein and water components. Tallow and lard have been used by civilizations around the world for thousands of years, not only for cooking and food prep but also for making candles, soaps, machinery lubrication, leather waterproofing, and skincare products. Not surprisingly, however, their popularity has declined since the mid-twentieth century as plant-based oils have become more widely available and dietary preferences have shifted.

Table 1. Top global seed oils by popularity.

Rank	Seed Oil	% of Global Production	Top Production Countries / Regions
1	Soybean oil	30–33%	US, Brazil, Argentina, China
2	Canola (rapeseed) oil	14–16%	Canada, EU, China
3	Sunflower oil	9–11%	Ukraine, Russia, EU
4	Cottonseed oil	3–4%	China, India, US
5	Corn oil	2–3%	US, China
6	Peanut oil	2–3%	China, India, Africa
7	Sesame oil	0.5–1%	China, India, Middle East
8	Safflower oil	0.2–0.4%	US, India, Mexico
9	Hemp seed oil	< 0.1%	Canada, EU
10	Poppy seed oil	< 0.1%	Central & Eastern Europe

Sources: FAOSTAT, OECD-FAO, USDA

Extended table description.

Despite the emergence of other options, tallow and lard continue to be valued for their savory, rich flavor and high smoke points, which allow them to perform exceptionally well in frying and other high-heat applications. Their unique stability under heat has fueled a small but notable resurgence in gourmet and specialty kitchens, where cooks and consumers appreciate the distinct bold flavor, reliable performance as a cooking agent, and predictable consistency.

Butter. Butter is a dairy-derived fat that is produced by mechanically churning milk cream until the butterfat separates from the buttermilk (**Figure 2**).

Figure 2. Butter produced from the cream portion of cow's milk.

As documented by The Churncraft Journal, butter derived from cow's milk was first popularized in the Middle East nearly 10,000 years ago. Because it was obtainable from domesticated hoof stock, it became of great importance in Sumer and other Mesopotamian regions where olive oil shortages occurred regularly. In the U.S., the popularity of butter in daily food prep grew dramatically in popularity following the development of mechanical refrigeration in the nineteenth century. Historically, the butter-making process was a domestic task often completed by children, illustrating its longstanding role in household food preparation. Its use declined somewhat during the twentieth century when margarine and other plant-based alternatives became more accessible, but it is still a staple in most home and commercial kitchens. Butter offers a rich, uniquely-creamy flavor and an appealing mouthfeel, making it a preferred ingredient in baked goods, sauces, and desserts. However, it burns substantially more easily than tallow/lard or seed oils due to its relatively low smoke point and the presence of milk solids.

Seed oils. Around the globe, seed oils (**Table 1**) are most frequently harvested from soybeans, canola (**Figure 3**), sunflowers, and cottonseed. On smaller scales, they are obtained from sesame seeds, peanuts, mustard seeds, poppy seed, and hemp seeds.

Figure 3. Canola Oil harvested from the seeds of canola (also known as rapeseed).

Table 2. Culinary properties of tallow, butter, and seed oils.

Fat Type	Smoke Point[1]	Best Uses	Texture	Flavor
Tallow	400 °F	Frying, roasting, high-heat use	Firm solid	Mild beefy
Butter	300 °F	Baking, low-heat sautéing	Soft solid (Spread)	Creamy, rich
Soybean Oil	450 °F	Deep frying, processed foods	Thin liquid	Neutral, faintly beany
Canola Oil	400 °F	Stir-fry, baking, salad dressing	Viscous liquid	Neutral, faintly nutty
Sunflower Oil	440 °F	Frying, baking, sautéing	Thin liquid	Neutral

[1] Smoke point is the temperature where the fat starts breaking down and starts to emit smoke.

Extended table description.

Today, high-fat oils are most commonly harvested from oil-rich seeds by chemical extraction (~70% worldwide), typically with a hexane solvent. This approach creates a higher yield but requires additional refining steps later in the process. A smaller fraction (~20% worldwide) of commercial seed oils are harvested by mechanical pressing, which is simplistic and chemical-free but creates a lower yield. Some large high-throughput factories perform a mechanical pre-press prior to chemical extraction (~10% worldwide) to maximize yield. Prior to the twentieth century, seed oils were not widely available as commercial products due to the tedious nature of the production process. However, after World War II, crop subsidies and advances in industrial technologies dramatically increased their commercial production and global availability. Today, seed oils are extensively used in foods as an ingredient and as a cooking medium. Their neutral flavor profile, liquid consistency, high smoke points, and generally low cost make them a preferred choice in large-scale food manufacturing. Moreover, the batch-to-batch consistency of most seed oils makes them particularly attractive to commercial processors. Among the most popular value-added uses for seed oils is in the production of margarine (i.e., oleo), a stable, inexpensive spread with a milder flavor than butter. In addition to foods, seed oils have also become popular components in soaps, plastics, detergents, paints, and industrial lubricants. The differences in culinary properties among tallow/lard, butter, and seed oils are important, as they affect the applications for which each is most useful.

Table 2 summarizes the smoke points, best uses, textures, and flavor profiles of these three common culinary fats.

Bioactivity & Nutritional Considerations

Dietary fats provide energy, are used in the structure of cellular membranes, support the absorption of fat-soluble vitamins, and are the precursors to numerous signaling molecules that regulate functions like inflammation, blood pressure, and even fertility. Although all fats contain about the same caloric value (roughly 9 kcal/gram), their propensity to be metabolized for energy differs based on the composition of the fatty acids they contain, with the primary determinant being the ratios of saturated and unsaturated fatty acids.

Saturated fatty acids. Saturated fatty acids contain no double bonds (**Figure 4A**), which results in straighter hydrocarbon chains that can be packed more tightly together in triglycerides (**Figure 5**).

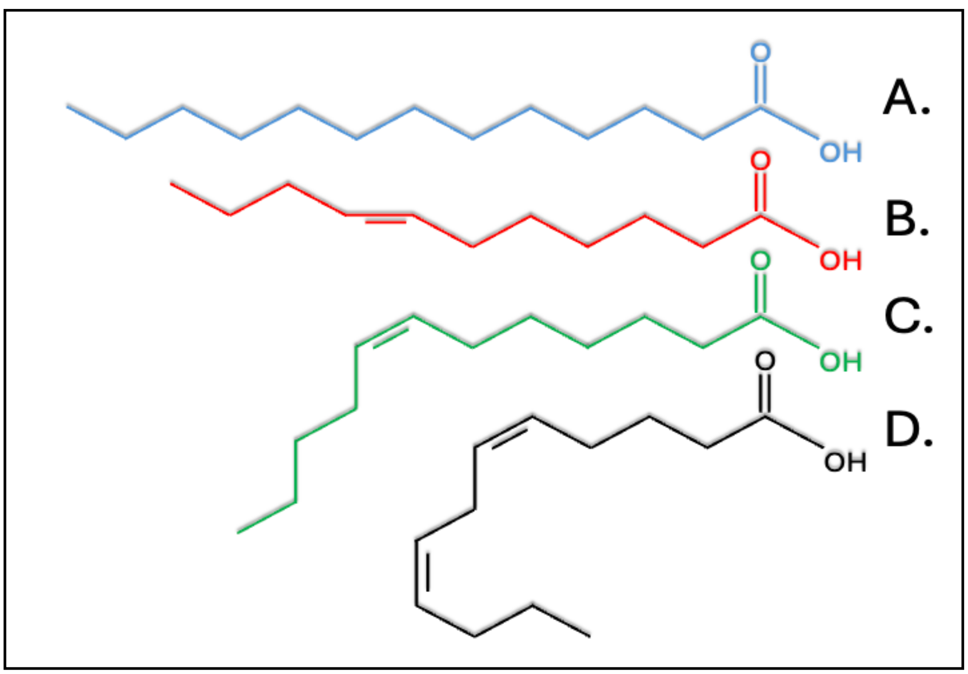

Figure 4. Chemical structures of saturated (**A.**), *trans* monounsaturated (**B.**; synthetic), *cis* monounsaturated (**C.**; natural), and polyunsaturated fatty acids (**D.**).

This tight clustering increases their resistance to oxidation, which makes them highly stable during cooking. However, it also reduces the rate at which cells metabolize them and increases their likelihood of being stored within cells as free fatty acids rather than triglycerides. These free lipids can be harmful to cells when stored in excess, although the greater health impact of saturated fats depends largely on the specific types consumed as well as overall dietary patterns. They can also induce systemic inflammation, which in turn disrupts a multitude of biological processes. Saturated fatty acids have a particularly rigid structure, which provides the membrane strength and inflexibility needed by some cell types. The 16-carbon palmitic acid and the 18-carbon stearic acid are the most highly abundant saturated fatty acids in food sources and constitute about 25% and 10%, respectively, of all dietary fatty acids.

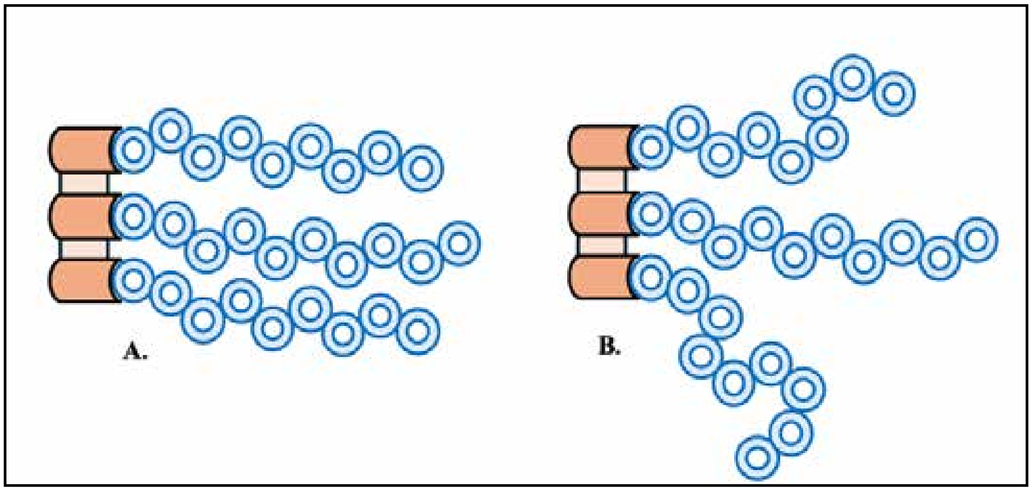

Figure 5. Storage of saturated fatty acids alone creates tightly compacted triglycerides (**A.**), but combining unsaturated and saturated fatty acids in triglycerides (**B.**) increases accessibility.

Monounsaturated fatty acids. Monounsaturated fatty acids contain a single double bond somewhere within their hydrocarbon chain (**Figure 4B, C**), giving them an intermediate level of stability, fluidity, and reactivity. Consequently, many of their biological functions can be categorized as intermediate between saturated and polyunsaturated fatty acids, including their propensity to be oxidized for energy. Monosaturated fatty acids are widely present in animal-derived and plant-derived fats. Unlike saturated fatty acids, they reduce LDL-cholesterol and are generally associated with beneficial cardiovascular effects. Additionally, they are critical components of the myelin sheaths that protect neurons of the brain and are often the most common fatty acid type in cellular membranes. When stored in triglycerides along with saturated fatty acids, monounsaturated fatty acids act as buffering agents that reduce the risk of cellular toxicity. In this role, they help maintain insulin sensitivity and glucose tolerance. Almost all naturally-occurring dietary monounsaturated fatty acids have a *cis* double bond that creates a 30° kink in the hydrocarbon chain, making them C-shaped. However, synthetically produced versions can have a *trans* double bond, which creates a “lazy-S” shaped hydrocarbon chain that functions more like a saturated fatty acid. The 18-carbon oleic acid, which houses its double bond between the 9th and 10th carbons, is by far the most abundant monosaturated fatty acid and is in fact the most abundant fatty acid of any type, constituting up to 40% of all dietary fatty acids. The 16-carbon palmitoleic acid (double bond between the 7th and 8th carbons) is the 2nd most common monounsaturated fatty acid, comprising up to 5% of total dietary fatty acids.

Polyunsaturated fatty acids. Polyunsaturated fatty acids contain two or more *cis* double bonds (**Figure 4D**), resulting in a highly-kinked hydrocarbon backbone that prevents them from lying flat against each other. This makes them far more accessible for metabolic enzymes and far more chemically active as functional modulators. Polyunsaturated fatty acids are substantially more potent as chemical messengers. They are the precursor molecules for prostaglandins and other hormones, and they are essential for proper nervous system function. Their role in immune function and inflammation depends upon their specific chemical structure. Omega-3 (ω-3) fatty acids (i.e., final double bond occurs 3 carbons from the end of the backbone) are fiercely anti-inflammatory, whereas omega-6 (ω-6) fatty acids (i.e., final double bond occurs 6 carbons from the end of the backbone) are typically considered pro-inflammatory. Thus, nutritional labels often provide ω-6:ω-3 ratios for products containing high amounts of polyunsaturated fatty acids.

Table 3. Approximate fatty acid composition of tallow, butter, and seed oils.

Source	Saturated Fats (SFA)[1]	Monounsaturated Fats (MUFA)[2]	Polyunsaturated Fats (PUFA[3]	ω-6 PUFA: ω-3 PUFA Ratio[4]
Tallow	50%	40%	4–5%	5:1
Butter	65%	30%	3–4%	10:1
Soybean Oil	15%	25%	55%	8:1
Canola Oil	7%	65%	28%	2:1
Sunflower Oil	11%	29%	60%	120:1

[1] Fats with no double bonds.

[2] Fats with a single double bond.

[3] Fats with two or more double bonds.

[4] Bioactive polyunsaturated fats than are inflammatory (ω-6 fats) or anti-inflammatory (ω-3).

Extended table description.

The two most common ω-3 fatty acids, eicosapentaenoic acid and docosahexaenoic acid (typically abbreviated as EPA and DHA on labels), are the active ingredients in fish oil and other anti-inflammatory nutritional supplements. Polyunsaturated fatty acids have a particularly flexible structure, providing the membrane fluidity needed by the cells that comprise the brain, eye, and nerves. They are also the only version of fatty acids that mammalian cells cannot produce themselves. Because they are needed for a multitude of cellular functions, they must be obtained through the diet, making them *essential dietary fatty acids.* Linoleic acid (ω-6; up to 20% of dietary fatty acids), arachidonic acid (ω-6; about 3% of dietary fatty acids), and α-linolenic acid (ω-3, precursor to EPA and DHA; about 1% of dietary fatty acids) are the most common polyunsaturated fatty acids in the typical diet. Tallow and butter, which are animal-derived products, contain relatively high proportions of saturated fats. By contrast, seed oils are rich in polyunsaturated fats and are often good sources of ω-6 and ω-3 fatty acids. **Table 3** summarizes the fatty acid composition of tallow, butter, and seed oils.

Shelf Stability & Storage

Shelf life varies substantially among the three major dietary fat sources. Tallow/lard, which is a firm solid at room temperature, is the most shelf-stable due to its low water content (usually less than 0.5%) and high relative amount of oxidation-resistant saturated fatty acids. When stored in airtight containers, tallow can remain stable for months at room temperature and for over a year when refrigerated or frozen. Butter, which is a soft spread at room temperature, is far more perishable due to its higher water content (up to 20%) and the presence of milk solids, which are particularly vulnerable to autoxidation and rancidity. Butter should not be kept at room temperature for more than a few hours, and repeated instances of warming to room temperature should be avoided. Refrigerated butter typically lasts only a few weeks once the air-tight container is opened, although salted butter tends to keep slightly longer. Frozen butter can be stored for up to a year. Seed oils, which are liquids at room temperature, fall between tallow and butter in stability. Their high polyunsaturated fat content makes them sensitive to light, heat, and air, but their low moisture content (less than 0.1%) helps to prevent microbial spoilage. They typically last several months at room temperature when unopened, and up to a year when refrigerated. The refining processes outlined in **Table 4**, including degumming, neutralizing, bleaching, and deodorizing, can extend the shelf life of seed oils by removing many of the compounds that are prone to oxidation.

Table 4. Processes for refining seed oils.

Process	Techniques	Outcome
1. Extraction	Mechanical press, hexane extraction	Crude oil extract
2. Degumming	Acidification, centrifugation	Removes phospholipids (cloudiness)
3. Neutralizing	Alkalinization, centrifugation	Removes free fatty acids (off-flavor, instability)
4. Bleaching	Adsorbent clay, heat, filter	Removes color pigments
5. Deodorizing	Steam distillation	Removes volatile compounds

Extended table description.

Production & Availability Concerns

The long-term availability of these three major culinary fat sources is dependent upon the health of the agricultural systems that produce them. Fluctu ations in the respective market conditions of each source are further influenced by the popularity of competing commercial uses, the environmental impact of their production, and changes in peripheral costs (e.g., fuel prices, labor shortages). Tallow is generally a locally-sourced product. It is considered a highly-efficient, low-waste commodity because it is generated as a byproduct of beef processing, thereby increasing carcass utilization. Although the global supply of tallow and lard is modest due to a relatively limited per-animal yield, its availability remains stable because it is tied directly to meat production. Demand for tallow has recently risen in niche food markets, renewable energy applications, cosmetics, and industrial oleochemicals. Its environmental footprint is absorbed within beef cattle production, as the rendering of tallow itself adds no particular environmental strain. The national and global availability of butter parallels the strength and productivity of the dairy sector. Dairy production supports rural economies, but like the beef cattle industry, requires intentional waste management and consumes a steady supply of natural resources. Because it is a component of the dairy industry, the market for butter is influenced by adjacent industries responsible for animal feed production, veterinary care, transportation, and grain markets. The substantial global demand for butter combined with the vulnerability of dairy animals to heatwaves and other environmental stress events contribute to the frequent volatility of butter prices. Seed oils are produced on a large global scale and rely on extensive cropping systems. Their effective production requires safe and responsible leveraging of genetic modification technologies, chemical fertilizers and growth promoters, and farmland use. Seed oils are typically the cheapest and most widely-available sources of culinary fats, which is a reflection of the global status for major row crop industries, particularly those for soybean, canola, and sunflower. Importantly, seed oils are not byproducts but rather the primary product of the crop. Thus, seed oils are in static competition with other seed-derived products for supply, production acreage, and processing capacity. Market projections anticipate continued growth in both food and industrial applications for seed oils worldwide.

Conclusion

Among the major types of culinary fat sources, the best choice depends on flavor preference, cooking method, nutritional considerations, shelf-life needs, and cost considerations for the specific application. Seed oils offer an inexpensive and reliable option, particularly for industrial food production. Tallow excels in high-heat cooking and specialty applications where flavor and stability matter most, although it may require intentional sourcing as it is less commonly available in grocery stores. Butter remains essential for baking, sauces, and traditional dishes that rely on its unique flavor and texture, although its perishability and price variability must be considered for larger-scale applications. For agricultural producers, understanding these distinctions can guide marketing strategies, value-added product development, and consumer education regarding their commercial product. Whether using rendered tallow in artisanal soaps and specialty foods, promoting the local dairy butter market, or producing high-quality seed oils, the characteristics of each fat not only influence individual culinary outcomes but the collective sustainability and economics of the broader food systems.

Additional Resources

Food and Agriculture Organization of the United Nations (FAO). 2025. *FAOSTAT—Oil crops and vegetable oil production*. doi: 10.4060/cd8035en.

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Gunstone, F.D. 2011. *Vegetable Oils in Food Tech nology: Composition, Properties and Uses*. 2nd ed. doi:10.1002/9781444339925.ch1.

Long Descriptions

Table 1: A global list of top 10 seed oils produced by popularity. Soybean oil makes up 30-33% of global production and is mass produced in the US, Brazil, Argentina, and China. Canola (also called rapeseed) oil makes up 14-16% of global production and is mainly produced in Canada, EU, and China. Sunflower oil makes up 9-11% of global production and is mainly produced in the Ukraine, Russia, and EU. Cottonseed oil makes up 3-4% of global production and is mainly produced in China, India, and US. Corn oil makes up 2-3% of global production and is mainly

produced in the US and China. Peanut oil makes up 2-3% of global production and is mainly produced in China, India, and Africa. Sesame oil makes up 0.5-1% of global production and is mainly produced in China, India, and the Middle East. Safflower oil makes up 0.2-0.4% of global production and is mainly produced in the US, India, and Mexico. Hemp seed oil makes up less than 0.1% of global production and is mainly produced in Canada and the EU. Poppy seed oil makes up less than 0.1% of global production and is mainly produced in the Central and Eastern Europe. Return to page 3.

Table 2: A list of culinary properties of tallow, butter, and common seed oils including smoke point, best uses, texture, and flavor. Tallow has a smoke point (the temperature where the fat source starts breaking down and emit smoke) of 400 F, best uses includes frying, roasting, high-heat use, its texture is firm and solid and has a flavor profile of mild beefy. Butter has a smoke point of 300 F, best uses includes baking and low-heat sauteing, its texture is soft solid (spread) and has a flavor profile of creamy and rich. Soybean oil has a smoke point of 450 F, best uses includes dep frying and processed food, its texture is a thin liquid and has a flavor profile of neutral, faintly beany. Canola oil has a smoke point of 400 F, best uses includes stir-fry, baking, and salad dressing, its texture is a viscus liquid and has a flavor profile of neutral, faintly nutty. Sunflower oil has a smoke point of 440 F, best uses includes frying, baking and sauteing, its texture is thin liquid and has a neutral flavor profile. Return to page 3.

Table 3: A table with the approximate fatty acid composition of tallow, butter and three seed oils. Tallow approximately contains 50% saturated fats, 40% monounsaturated fats, 4-5% polyunsaturated fats, and a 5:1 ratio of omega-6-to- omega-3 polyunsaturated fats. Butter approximately contains 65% saturated fats, 30% monounsaturated fats, 3-4% polyunsaturated fats, and a 10:1 ratio of omega-6-to-omega-3 polyunsaturated fats. Soybean oil contains approximately 15% saturated fats, 25% monounsaturated fats, 55% polyunsaturated fats, and an 8:1 ratio of omega-6-to- omega-3 polyunsaturated fats. Canola oil contains approximately 7% saturated fats, 65% monounsaturated fats, 28% polyunsaturated fats, and a 2:1 ratio of omega-6-to- omega-3 polyunsaturated fats. Sunflower oil contains approximately 11% saturated fats, 29% monounsaturated fats, 60% polyunsaturated fats, and a 120:1 ratio of omega-6-to- omega-3 polyunsaturated fats. Return to page 5.

Table 4: Outline of the process for refining seed oils. Extraction using a mechanical press or hexane extraction technique is used to extract the crude oil. Degumming via acidification and centrifugation is used to remove phospholipids which allows cloudiness of product. Neutralizing using alkalinization and centrifugation techniques are used to remove the free fatty acids that contributes to off-flavors and instability. Bleaching via adsorbent clay, heat and filtration removes color pigments. Lastly, deodorizing via steam distillation removes volatile compounds from the seed oil. Return to page 5.

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