

MODULE 6: FOOD AND SUSTAINABILITY – LEGUMES AND THE PROTEIN TRANSITION



Food and Sustainability: Legumes and the Protein Transition



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The topic of protein transition—understood as a shift toward higher consumption of plant-based proteins and a corresponding reduction in animal-derived proteins—plays a key role in the various interpretations of “sustainability.” The production and consumption of legumes have well-documented positive effects on human health, as well as on environmental and economic sustainability. This presentation provides a broad overview of the issue, fostering greater awareness of animal protein consumption and encouraging its gradual reduction in favor of plant-based sources.



Sustainability

What kind of sustainability?

Environmental
Economic
Climate
Social

Integrated or Alternative?



The multiple meanings of the term *sustainability* sometimes lead us to focus only on the dimension we perceive as most relevant, resulting in partial or even conflicting messages. It is therefore essential to ask whether these dimensions are truly irreconcilable, or whether they can be integrated into a broader and more coherent framework.



Sustainability for Slow Food

This can be summed up in a slogan:
Good, Clean, and Fair for All encompasses and integrates all definitions.



For Slow Food, food-related sustainability is captured in the slogan *Good, Clean and Fair for All*. This means that food should be:

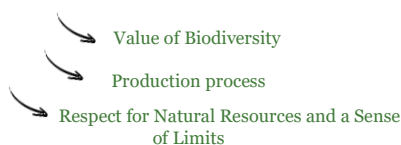
- good, meaning enjoyable and pleasing to the palate;
- clean, meaning produced with full respect for the environment across all stages of the supply chain—from production to distribution, processing, and consumption;
- fair, meaning that appropriate remuneration (economic and social sustainability) must be ensured for those who produce and process food, as well as for those who consume it;
- for all (social sustainability), meaning that everyone should have access to healthy, high-quality food.

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Sustainability for Slow Food

•Food production, processing, and distribution in harmony with the ecosystem: Quality, Healthiness, Taste, Nutrition, Health, Environment, Climate



The key elements required to ensure this form of sustainability include:

- the quality of raw materials and the enhancement of biodiversity, which encourages the use of products adapted to local environments;
- the adoption of production processes that respect both the environment and product safety;
- acknowledging the limits of natural resource use and preventing.



The Protein Transition

For responsible consumption of animal proteins
To promote the use of plant-based proteins

for the environment and climate,

for the soil

for health and taste



Protein transition does not imply a radical replacement of animal proteins with plant-based ones. Rather, it reflects a commitment to reducing the challenges associated with excessive consumption of animal-derived proteins. It means promoting a more responsible use of these foods—moderating both frequency and quantity—and encouraging their gradual substitution with plant-based sources, particularly legumes, which offer multiple benefits:

- for the environment and climate, as they require low inputs (including significantly less water and other natural resources) and generate lower emissions during production;
- for soil health, thanks to their ability to regenerate soil fertility by enriching it with nutrients that also benefit subsequent crops;
- for health and taste, due to their favorable combination of proteins and carbohydrates.

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Protein Transition:
All Vegetarians or Vegans?

Let's avoid clichés

Are livestock farms only a source of problems?

What are the critical issues? Which farms? How are they managed? Can they be compatible with animal well-being? Sustainable with the environment and climate? Respectful of human health? In harmony with agricultural activities?






All of this does not mean completely abandoning animal proteins, nor viewing livestock farming solely as a source of problems. When managed sustainably, it can provide real value for agriculture and for local communities. This is why it is important to move toward more mindful consumption, giving preference to supply chains that are environmentally responsible, climate-friendly, and respectful of animal welfare.





Animal Proteins and Critical Issues

Intensive farming

- Environmental:** exploitation of natural resources
- Climate:** emissions
- Health and Nutrition:** unbalanced diet, antibiotic resistance
- Ethics:** animal welfare, labor exploitation






The main concerns relate to intensive livestock operations, more accurately described as “industrial,” because they follow production logics similar to factories rather than the natural cycles of agriculture and animal husbandry. In these facilities, animals are kept in very large numbers, confined in restricted spaces, often without agricultural land to support them, and housed in fixed stalls—conditions that increase the risk of disease and epidemics and require extensive use of medications. These systems aim to maximize profit through high production performance and shortened fattening times, generating several critical issues: heavy consumption of water and natural resources; production of wastewater and manure that, in the absence of land, become waste to be disposed of; high CO₂ and methane emissions; intensive use of antibiotics; limited attention to animal welfare; and, finally, social problems linked to worker exploitation.

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Sustainable farming

• **Farms that respect**
Animals: Animal welfare, free-range farming, pastures
Environment: circular economy; from waste to resources
Climate: reduced emissions
Health and Nutrition: healthy products, reduced use of drugs
Ethics: respect for workers
Social: protection of the territory (marginal and mountain areas)



There are also truly “sustainable” livestock systems that ensure high standards of animal welfare throughout the entire life cycle—from birth to slaughter—through practices such as cow-calf operations, free-stall housing in spacious environments, pasture-based management, and the use of permanent grasslands.

These systems also have positive environmental effects: they reduce emissions, enhance the value of manure by transforming it from waste into a resource for soil fertility, and do not require intensive use of antibiotics thanks to less crowded and healthier living conditions.

They also respect workers and generate social benefits by helping keep mountain and marginal areas alive, supporting human presence and land stewardship, and thereby preventing degradation and abandonment.

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So what kind of protein transition?

Reduction in the consumption of animal proteins

- Reducing the consumption of animal proteins and increasing that of vegetable proteins, mainly derived from legumes.
- Improving quality by choosing eco-sustainable farms.



Promoting protein transition therefore means:

- reducing (rather than completely eliminating) the consumption of animal proteins in favor of plant-based ones;
- guiding choices toward animal proteins that come from environmentally sustainable livestock systems.

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The Protein Transition: Legumes

Good for the environment and climate

- Respect for Natural Resources
- Reduction in Energy Inputs (fertilizers and pesticides)
- Reduction in CO₂ Emissions
- Protection of Biodiversity

SUSTAINABLE NUTRITION

KEEP THE PLANET



The slide presents the key points for supporting and promoting the consumption of legumes.

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The Protein Transition: Legumes

Good for the environment and climate: Biodiversity

Genetic diversity ensures:

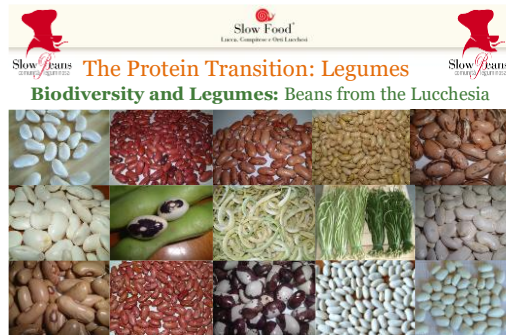
- adaptation to climate change
- adaptation to different environments and contexts
- conservation of natural resources
- the health of the planet

**Biodiversity is Life itself.
For Peoples, Nature, and the Planet**



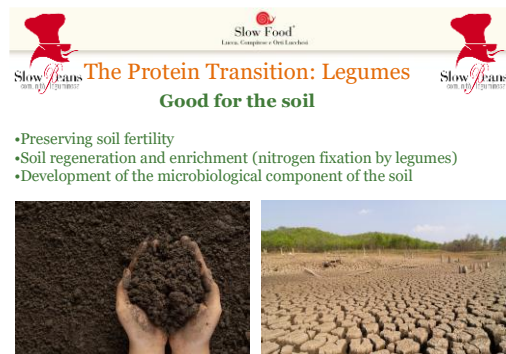
Genetic diversity is essential because it enables plants and animals to adapt to climatic, environmental, and soil-related changes, making the most of natural resources through locally adapted ecotypes and breeds found across different regions. In this sense, biodiversity supports the planet's health and resilience. A well-known example is the Irish famine of the late 1800s: the potato disease was overcome thanks to potato ecotypes discovered in the Andes that were resistant to that pathogen. The same principle applies today: if 90% of the apples consumed come from only five varieties, losing the others—often grown in small quantities—would pose a significant risk. Biodiversity, therefore, is not a minor detail; it is the foundation of the life of communities, nature, and the planet.

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Over 17 different ecotypes in the province of Lucca Adaptation to different environments, nutritional variety, and taste

The *Fagioli della Lucchesia* are a concrete example of biodiversity: in the early 2000s, a project by the Tuscany Region identified as many as 17 different ecotypes in the province of Lucca alone. Such a wide range of diversity, concentrated in a limited area, highlights the richness of legume biodiversity, as these varieties differ in their nutritional and sensory characteristics and in their ability to adapt to different environments.




- Preserving soil fertility
- Soil regeneration and enrichment (nitrogen fixation by legumes)
- Development of the microbiological component of the soil

Legumes play a fundamental role in soil health: they not only preserve soil fertility—often compromised by other crops and by intensive production systems—but also improve it by enriching the soil with nitrogen. This occurs through their symbiosis with bacteria capable of fixing atmospheric nitrogen and making it available in the soil. Their cultivation also supports the development of the soil's microbiological component, which in turn makes other essential mineral elements accessible to plants. Soil fertility loss is often underestimated, yet it is one of the main causes of declining agricultural yields: soil is not merely a physical support, but a living system that interacts with plant roots through continuous exchanges.

As shown in the photo, soil must be porous, biologically active, and rich in organic matter in order to have a positive effect on crop production.

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The Protein Transition: Legumes
Good for health

- Legumes are a valuable source of carbohydrates and proteins.
- Excellent source of micronutrients and fiber.
- High nutritional density of dried legumes.
- 10% water; 60% carbohydrates (slow absorption); 20% protein; 4% lipids
- Minerals (copper and iron); vitamins (B1, B2, B5)
- 20% protein, like meat, but lacking two essential amino acids: methionine and cysteine, which are present in cereals, so...

...Legumes and grains = A perfect match!
No deficiencies, complete amino acid profile




Legumes are valuable foods for nutrition and health: they provide proteins, carbohydrates, fiber, vitamins, and minerals. Although they are low in two essential amino acids, this limitation is easily compensated by pairing them with grains. It is no coincidence that many traditional recipes combine grains and legumes—a perfect match that ensures a complete protein intake.




The Protein Transition: Legumes
Good for health

- Slow-absorbing complex carbohydrates (starches)
- The “sugar” (glucose) derived from the digestion of legume starch passes slowly into the bloodstream, avoiding a “glycemic spike.”
- The high fiber content slows down its absorption.

Low Glycemic Index



The carbohydrates in legumes are particularly valuable because they are slowly absorbed: they do not cause blood sugar spikes and release energy gradually, making them suitable even for people with sugar sensitivity, such as those with diabetes. Their high fiber content also contributes to this effect by further slowing intestinal absorption of carbohydrates and supporting better glycemic balance.





The Protein Transition: Legumes
Good for health: minerals and vitamins

- Important sources of B vitamins
- Calcium present in quantities similar to those found in milk.
- Iron present in quantities similar to those found in eggs and some meats.
- Iron potentially less absorbable: supplement with fruits and vegetables rich in vitamin C: kiwis, oranges, strawberries, cabbage, peppers, tomatoes.



The nutritional profile of legumes also includes a significant amount of B-vitamins, calcium, and iron, in quantities comparable to those of other foods commonly associated with these nutrients: milk for calcium, and eggs and meat for iron.

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The Protein Transition: Legumes

Good for health: digestibility

- It is important to soak the beans (for about 12 hours) to eliminate some of the “anti-nutritional” components, which are then completely eliminated during cooking.
- To remove the foam that forms on the surface during cooking.
- To accompany legume dishes with digestive aromatic herbs such as sage, rosemary, and thyme.



When it comes to the digestibility of legumes and their possible side effects, it is important to remember that many difficulties depend on our microbiota—the billions of microorganisms that live in symbiosis with the human body. A rich and diverse microbiota supports good digestion and allows us to make the most of the nutritional properties of foods. When the diet is not very varied or legumes are consumed only occasionally, the microbiota may be less “trained,” which explains why some people tolerate them less well. To improve their digestibility, a few simple practices can help: soaking legumes before cooking, removing the foam that forms during cooking, adding digestive herbs such as sage, rosemary, or thyme, and removing the outer skin.




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The Protein Transition: Legumes



Good for health: digestibility

- By including them regularly in our diet, our body (the intestinal flora) adapts to their consumption.
- Those who are not used to eating them regularly can start with small amounts and gradually increase their consumption.
- Digestibility improves if the legumes are pureed and the “skin” is removed. The outer skin contains the least digestible substances.



It is therefore important to help the body gradually adapt to legumes by including them regularly in the diet, starting with small amounts and then progressively increasing consumption. In the beginning, it can also be helpful to remove the outer skin, which contains the least digestible components.

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The Protein Transition: Legumes
Good for Taste

Legumes in the kitchen: tradition and innovation

A few examples

- Traditional recipes:** Frantoiana soup, spelt soup, Farinata, beans with tomato sauce, baked beans, chickpea cake, legume purées, beans cooked in a flask
- Innovative dishes:** Lentil tofu, hummus, lentil ragout, lentil meatballs, legume burgers



Famous and little-known legumes:
 Peanuts, Chickpeas, Grass Peas, Beans, Broad Beans, Lentils, Lupins, Peas, Roveja, Soybeans

The use of legumes in cooking is extremely versatile: you can move from traditional dishes, such as soups—where legumes are often paired with vegetables and wild herbs—to more innovative preparations or recipes from other cultures, such as hummus and tofu.

By following your curiosity, you can discover unexpected ways to highlight these foods and achieve surprising results. And we're not just talking about beans and chickpeas: there are many other legumes which, when you explore the culinary traditions of different regions, reveal an extraordinary richness of uses and cultural heritage.



LEGUMES AS A SINGLE COURSE



Lentil Ragout

- While the pasta cooks, sauté the celery, carrot, and onion in a pan with a little oil and water.
- Cover the pan and cook until the vegetables are soft.
- Add the lentils and tomato sauce, then cook over low heat for the entire time the pasta is cooking.
- Toss the pasta with the lentil sauce.

Recipe example: Pasta with lentil ragù. As mentioned earlier, the combination of carbohydrates and legumes is a perfect match!



LEGUMES AS A SECOND COURSE

Chickpea burger fast



- Chop the celery, carrot, and onion in a food processor.
- Add the cooked chickpeas to the food processor along with paprika, salt, pepper to taste, and a little oil; blend and mix, stirring the mixture with a spoon.
- Add the oat flakes and a little water to the mixture: if the mixture is too soft, add a little breadcrumbs to achieve the right consistency.
- Cook in a pan until crispy.

Chickpea hummus super fast



- Put the cooked chickpeas in a food processor and add lemon juice, tahini, oil, a clove of garlic, salt, and pepper to taste.
- Blend until you get the right consistency: add a bit of water if needed.
- What is tahini? It's a sesame seed-based sauce that's a specialty of Middle Eastern cuisine.

Examples of quick and tasty recipes featuring legumes.

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LEGUMES AS A SNACK

Baked chickpeas



- Mix the cooked chickpeas, a little flour, a drizzle of oil, and spices to taste, including paprika, turmeric, curry, and chili pepper, in a bowl.
- Spread the chickpeas out evenly on a baking sheet and bake at 180°C in a preheated oven until they are golden brown and crispy (about 25-30 minutes).

Example of a quick and tasty legume-based recipe, perfect as a snack!



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