

COUNTRY FACT SHEETS

TURKEY

COUNTRY

TÜRKIYE hosts more than 85 million people within a total surface area of 769,630 km². 77.5% of the population lives in cities.

Izmir is located on the western coast of Turkey, on the Aegean Sea coast, with a population of 4,462,056. Ege University, one of the project partners, is a public university founded in Izmir in 1955.

A total of 2740 undergraduate students study at the Faculty of Agriculture.

ALTERNATIVE PROTEIN SOURCES IN THE COUNTRY

Partial replacement of soybeans in poultry production with national and/or regional agro-industrial by-products will contribute to the growth of the local economy and sustainability. Possible local agri-industrial protein sources in Turkey are:

- Oil industry by-products such as sunflower meal, camelina oil meal, cottonseed meal,
- Vegetable industry by-products such as dried tomato pulp, dried grape pomace and brewers' dried grain,
- Bakery byproduct such as wheat middling
- Seafood processing by product such as fish meal,
- Dairy industry byproduct such as whey powder.
- Black soldier fly larvae meal (BSFLM), which is an innovative alternative can also be used as a soybean

POULTRY FARMING IN THE COUNTRY

The poultry sector is one of the most developed agricultural sectors in Turkey. Turkey has a poultry industry that produces for both domestic consumption and export. Turkey produced 2.25 million tonnes of chicken meat and 19.3 billion eggs in 2023. Chicken meat and egg consumption is 21 kg and 200 eggs per person per year in Turkey.

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- Anadolu-T was used as a local broiler strain. A commercial fast-growing broiler line (Cobb 500) was also added to the experimental design to evaluate the effects of alternative diets on today's commercial strain.
- Alternative ingredients, such as sunflower seed meal, brewer's dried grain, wheat middlings, and dried black soldier larvae were added to broiler diets to evaluate their effect on performance, welfare, health, and economic criteria.
- The demonstration activities started on May, 2022, and ended in July 2022.

DID YOU KNOW?


Among plant protein sources, soybeans have the highest crude protein content at approximately 40%, a balanced amino acid profile with a very good digestibility. The soybean is currently critical to meeting the feed needs of the existing poultry population, but it also raises major sustainability concerns: Soybean production is linked to water pollution, deforestation, climate change, and biodiversity loss. In addition, long-distance transportation also poses environmental challenges.

INFORMATION

The findings of the study indicated that

 An alternative diet (ALT) in which soybean meal was partially substituted with agro-industrial byproducts such as sunflower meal, brewers' dried grain, and wheat middlings met the nutritional requirements of chickens without affecting slaughter weight and feed conversion.

 Incorporation of 5% BSFLM into ALT (ALT+BSFLM) improved the growth of chicks during the first 10d post-hatch.

 The diets did not affect chicken health and breast meat quality. The ALT+BSFLM improved amino acid content for aroma, flavor, tasty and umami flavors.

 The ALT+BSFLM improved intestinal microbiota.

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COUNTRY FACT SHEETS



COUNTRY

ITALY is home to approximately 60 million people, covering a total surface area of 301,340 km², with around 71% of the population residing in urban areas. The capital, Rome, is located in central Italy and serves as both the cultural and historical heart of the country. With a population of nearly 3 million, Rome is home to iconic landmarks such as the Colosseum, the Vatican, and the Pantheon, which attract millions of visitors each year and highlight Italy's rich heritage.

Turin, located in the northwestern part of Italy near the Alps, is a significant industrial and cultural center with a population of approximately 870,000. Known for its historical importance in the automotive industry and as the headquarters of major Italian companies, Turin is a hub of innovation and education. The University of Turin, a project partner, was founded in 1404, making it one of Italy's oldest and most prestigious universities. A total of 2,200 undergraduate students are currently enrolled in its Faculty of Agriculture, where research on sustainable practices and alternative protein sources is actively conducted.

ALTERNATIVE PROTEIN SOURCES IN ITALY

In Italy, the development of alternative protein sources is centered on sustainability and reducing dependency on imported soybeans, commonly used in animal feed. Researchers and agricultural producers are increasingly utilizing regional agro-industrial by-products, which help minimize environmental impact and support circular economy practices. Local protein sources are diverse and make efficient use of agricultural and industrial waste, turning it into valuable resources for animal feed. Below are some key alternative protein sources being explored:

- Sunflower meal – By-product from the oil industry
- Grape pomace – Leftover from wine production, rich in nutrients
- Whey powder – By-product of dairy production
- Brewer's dried grains – Residue from beer production
- Black soldier fly larvae meal – An innovative, high-protein alternative

POULTRY FARMING IN ITALY

The poultry sector is one of the most developed agricultural sectors in Italy and produces for both domestic consumption and export. In 2023, Italy produced approximately 1.4 million tonnes of chicken meat and 13.5 billion eggs. Annual per capita consumption is about 20 kg of chicken meat and 220 eggs.

DID YOU KNOW?

Soybean is one of the richest plant-based protein sources, with around 40% crude protein, a well-balanced amino acid profile, and excellent digestibility. However, its production raises significant sustainability concerns, contributing to water pollution, deforestation, climate change, and biodiversity loss. Furthermore, the need for long-distance transportation adds to their environmental impact.





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- Local Breed: The study used Bianca di Saluzzo chickens, a traditional Italian breed well-suited to regional farming conditions and valued for its quality meat.

- Alternative Diet: Two diets were tested – a fully soybean-free diet that used local ingredients like faba beans and pea protein, and a standard soybean-based diet. The alternative aimed to reduce reliance on imported soy by using sustainable, locally sourced plant proteins.
- Environmental Enrichment: Dehydrated black soldier fly larvae were included as environmental enrichment. This provided additional protein and encouraged natural pecking behaviors, enhancing animal welfare.
- Best Farming Practices: The study produced best-practice farming guidelines to help local farmers adopt sustainable methods, support local biodiversity, and reduce the environmental impact of poultry farming.

INFORMATION

The study's findings revealed that:

-  Soy-Free Diet: The soybean-free diet performed equally well compared to the conventional diet while reducing the environmental impact of production and transport by 33%.
-  Black Soldier Fly Larvae Enrichment: Incorporating black soldier fly larvae as environmental enrichment for slow-growing, native chicken breeds proved both nutritionally beneficial and supportive of animal welfare. Chickens given larvae showed lower stress levels compared to those raised without larvae.
-  Consistent Product Quality: The quality of the final poultry product remained unchanged, ensuring that the soybean-free diet and larvae supplementation did not affect meat quality.
-  Natural Diet Compatibility: Insect larvae are a natural part of chickens' diets. Enzyme analysis indicated the development of digestive enzymes, such as chitinase for breaking down insect components like chitin, in chickens fed with larvae, unlike those not given larvae. This confirms chickens' inherent adaptability to insect-based protein sources.

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PRIMA
IN THE MEDITERRANEAN AREA

COUNTRY FACT SHEETS

SPAIN

COUNTRY

SPAIN has a population of approximately 47 million people. Its climate is diverse, predominantly Mediterranean, with hot, dry summers and mild, rainy winters. This climatic diversity supports a wide variety of crops, such as cereals, fruits, vegetables, and olive oil. Despite producing a wide variety of crops, the country is a net importer of raw materials, with nearly 100% of its soybean meal being imported. In terms of livestock, Spain is a leader in pork production, with significant cattle, poultry, and sheep industries. These are supported by extensive rural areas and modern animal breeding and feeding techniques, making agriculture and livestock key sectors in the country's economy.

ALTERNATIVE PROTEIN SOURCES IN THE COUNTRY

Alternative plant-based protein sources are feed ingredients derived from plants that can replace traditional protein sources like soybean meal in livestock diets. These alternatives are often locally available, more sustainable, and can help reduce reliance on imported feed. They are important for improving the environmental impact of animal agriculture, lowering production costs, and diversifying the protein sources in animal feed to ensure optimal nutrition while reducing ecological footprints. Examples include byproducts from oilseeds, legumes, and grains:

- Sunflower meal is a byproduct of extracting oil from sunflower seeds. It has a moderate protein content (30-40%) and is high in fiber.
- Peas (*Pisum sativum*): Peas are a legume rich in protein (22-25%) and have a good lysine content, which is crucial for animal growth.
- Corn Distillers Dried Grains with Solubles (DDGS): Corn DDGS is a byproduct of ethanol production, containing 25-30% protein. It is widely used in ruminant feeding, although an optimized use of it could obtain good results in monogastrics.


POULTRY FARMING IN THE COUNTRY


The poultry sector in Spain is thriving and remains one of the most important in the country's agricultural industry. It is a leader in both meat and egg production, contributing significantly to Spain's economy. Spanish poultry farms are known for their high standards of animal welfare and food safety, using innovative technologies to ensure sustainable and efficient production. Spain is also a key exporter of poultry products to the European Union and beyond, reinforcing its strong presence in global markets.


DID YOU KNOW?

Animal feed is the most environmentally impactful element in the entire poultry meat and egg production chain. This impact can be significantly reduced by decreasing the use of imported ingredients and incorporating by-products or locally sourced ingredients.

INFORMATION

 In an experiment conducted in Murcia with native Mediterranean hens, which included more locally sourced ingredients and dried insect larvae, environmental impact reductions of around 11-12% were achieved.

 Furthermore, in this experiment, the egg production and quality of hens fed alternative diets (sunflower meal, DDGs, and peas), as well as those supplemented with *Hermetia illucens* larvae, were not generally affected compared to eggs produced from commercial diets.

 Consumer acceptance of these eggs was very positive, with no noticeable difference between eggs from hens fed alternative diets and those from hens fed conventional diets during egg tasting sessions.

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TUNISIA

COUNTRY

TUNISIA is a North African and Mediterranean country. Its Surface area: 163,610 km². More than 30% of the country's surface area is covered by the Sahara desert, with the rest made up of mountainous regions and fertile plains. Tunisia's climate is divided into five bioclimatic zones, the desert, the arid, the semi-arid stage, the sub-humid stage, and the humid stage. Tunisia, home to almost 12 million people. And it is considered to be one of the countries most exposed to climate change in the Mediterranean. The agricultural and fisheries sector is considered one of the most important components of the national economy. It is characterised by a wide range of crops, from cereals (wheat, barley) to fruit and vegetables (olives, dates, citrus fruits), as well as dairy products, meat and eggs. However, this sector is also highly prone to climate risks. Ninety-three percent of the cropland is dedicated to rainfed agriculture, so production is largely dependent on rain. Due to this situation Tunisia imports large quantities of food products and raw materials. However, this sector is also highly prone to climate risks. Ninety-three percent of the cropland is dedicated to rainfed agriculture, so production is largely dependent on rain. Due to this situation Tunisia imports large quantities of food products and raw materials.

ALTERNATIVE PROTEIN SOURCES IN THE COUNTRY

Main alternative protein sources in Tunisia that may substitute imported soya grains are faba beans (*Vicia faba* var minor, rapeseed produced locally. Other local protein resources can be valorized such as lupin (*Lupinus albus*), peas (*Pisum sativum*), *Vicia narbonensis* grains. These protein crops are currently the subject of a number of research projects in Tunisia. These sustainable legumes, with their rhizobia, enrich soils with nitrogen. Their incorporation in animal nutrition can decrease carbon footprint.

POULTRY FARMING IN THE COUNTRY

Industrial poultry farming in Tunisia began in the late 1960s. Actually, poultry sector in Tunisia supplies 50% of the country's total meat needs, as well as the entire requirement for table eggs. The sector accounts for around 25% of the value of livestock farming, and 8% of agricultural production. It is well organized with a professional group which plays a key role in regulating, managing and promoting the industry. Production, slaughtering, cutting and processing are carried out by private structures. One of the major challenges facing the poultry sector is the increase in world prices for raw materials, particularly soya and maize, as a result of the current global economic situation and the reliance of the sector on imported feed ingredients.

DID YOU KNOW?

BSF larvae are rich in nutrients (proteins and lipids) and represent an extremely interesting sustainable alternative protein source for poultry sector. Their production has lower carbon and water footprint than imported soybean crops.

INFORMATION

Slow breed meat chickens and commercial laying hens trials were conducted in Chott Mariem (Sousse)-Tunisia. In each experiment three diets were formulated: A control diet based on imported corn and soybean meal (SBM) was compared to an Alternative 1 diet including local triticale and faba beans to substitute partially corn and SBM and a third diet is composed by an alternative concentrate supplemented with BSF dry larvae (Alternative 2). Overall growth performance in meat chickens was not affected besides the decrease of feed intake in both alternative diets. Cutting carcass yields were higher especially in birds fed Alternative 2 including dehydrated larvae and local ingredients and larvae in Alter 2 decreased lipid oxidation. Overall consumer appreciation was higher in meat of Alternative 2 group. In laying hens, feed intake and feed conversion ratio were similar in all the lots. Egg production in Alter 1 was similar to the control diet, while in Alternative 2 +BSF it was about 2% lower. Consumer appreciation was similar for the tasted eggs of the different groups.

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