Н.А. Ткаченко, д-р техн. наук, професор, *E-mail:* nataliya.n2013@gmail.com
О.Г. Клименко, аспірант, *E-mail:* ksuklim2013@gmail.com
Кафедра Технології молока, олійно-жирових продуктів та індустрії краси
Одеський національний технологічний університет, м. Одеса

ВПЛИВ НАСІННЯ ЛЬОНУ (Linum usitatissimum L.) НА РОЗВИТОК МІКРОФЛОРИ ПРИ ЗБЕРІГАННІ ПРОБІОТИЧНОГО СИРУ СУЛУГУНІ

Анотація

У роботі наведено результати дослідження впливу обробленого парою насіння льону (Linum usitatissimum L.) на якість та безпечність пробіотичного сиру Сулугуні у процесі зберігання у вакуумному пакуванні за температури 3±1℃ та відносної вологості повітря 85±5%. Встановлено, що додавання 2% обробленого парою насіння льону до пробіотичного сиру Сулугуні підвищує мікробіологічну стабільність продукту, стримує розвиток небажаної мікрофлори, зокрема БГКП, та забезпечує відповідність стандартам безпечності протягом 90 днів зберігання. Доведено, що включення насіння льону до складу пробіотичного сиру Сулугуні позитивно впливає на збереження життєздатності лактобактерій (у т.ч. пробіотичної культури Lactobacillus acidophilus La-5) протягом усього терміну зберігання. Високі пробіотичні властивості сиру «Сулугуні з насіння льону» відзначаються протягом 75-ти діб зберігання, оскільки кількість життєздатних клітин S. thermophilus та L. helveticus + L. acidophilus La-5 протягом зазначеного терміну складає $1,1\times10^{7}...9,0\times10^{8}$ та $8,0\times10^{7}...1,04\times10^{9}$ КУО/г відповідно. Зафіксована динаміка підтверджує виражений пребіотичний ефект біоактивних компонентів насіння льону, які сприяють створенню оптимальних умов для тривалої життєздатності лактобактерій, у т.ч. пробіотичних культур. Дослідження органолептичних показників продемонстрували, що додавання насіння льону до пробіотичного сиру Сулугуні сприяє збереженню еластичності та шаруватості сирної маси, кремового кольору та формуванню характерного м'якого горіхового присмаку, що підвищує сенсорну привабливість продукту. Наявність 2% обробленого парою насіння льону у пробіотичному сирі Сулугуні забезпечила збереження високих органолептичних та нормованих фізико-хімічних показників продукту протягом 75-ти діб зберігання. Тому рекомендовано встановити термін зберігання пробіотичного сиру «Сулугуні з насінням льону» у вакуумному пакуванні за температури 3±1℃ та відносної вологості повітря 85±5% не більше 75-ти діб, що на 15 діб перевищує таку для сиру Сулугуні згідно діючого стандарту.

Ключові слова: сир; Сулугуні; насіння льону; продукт оздоровчого призначення; пробіотик; фізико-хімічні, органолептичні, мікробіологічні показники якості; мікробіологічна стабільність; безпечність; зберігання.

Received 08.08.2025 **Revised 12.09.2025**
Reviewed 17.08.2025 **Approved 02.12.2025**

Cite as Vancouver Citation Style
Tkachenko N.A., Klymenko O.G. Influence of flax seeds (Linum usitatissimum L.) On the development of microflora during storage of probiotic suluguni cheese. Grain Products and Mixed Fodder's, 2025; 25 (4, 100): 12-19. DOI https://doi.org/10.15673/gpmf.v25i4.3311

Cite as State Standard of Ukraine 8302:2015
Influence of flax seeds (Linum usitatissimum L.) On the development of microflora during storage of probiotic suluguni cheese. / Tkachenko N.A. et al. // Grain Products and Mixed Fodder's. 2025. Vol. 25, Issue 4 (100). P. 12-19.
DOI https://doi.org/10.15673/gpmf.v25i4.3311

UDC 636.085

Alltech, *E-mail: jnorrie@alltech.com*

DOI https://doi.org/10.15673/gpmf.v25i4.3312

Agri-Food Outlook 2025. GLOBAL OVERVIEW

Despite Challenges, Feed Production Increased in 2024

After a stagnant 2023, global feed production rebounded in 2024, according to Alltech's 2025 Agri-Food Outlook, which estimates that feed production expanded by 16.7 million metric tons (mt) in 2024, an **increase of 1.2%**. This growth — achieved despite challenges such as **highly pathogenic avian influenza** (HPAI), **climate fluctuations** and **economic uncertainty** — underscores the resilience and adaptability of the international agriculture industry.

The growth in global feed production was **driven largely by the poultry sector**, which retained its outsized command of the market share, **accounting for 42.7% of all feed tonnage**, although the sector's growth slowed somewhat this year due to HPAI. The ruminant (beef: +1.8%; dairy: +3.2%) and pet food (+4.5%) sectors also performed impressively.

From a regional perspective, **resilience led to notable growth in Europe (+2.7%), Latin America (+3.6%) and Africa and the Middle East (+5.4%)**. In Oceania, Australia recorded a record 11% growth in its beef feed volumes.

The overall **decline in production seen in Asia-Pacific** (-0.8%) stemmed from sharp contrasts amongst species. Gains in dairy (+2.4%) and pet feeds (+11%), for example, were largely offset by declines in aquaculture (-1.7%) and beef (-6.0%), resulting in a net decrease for the region.

Now in its 14th year, Alltech's annual feed survey draws on data from 142 countries and 28,235 feed mills. By analyzing compound feed production and prices, the survey provides a comprehensive snapshot of global feed production. These insights serve as a barometer for the overall livestock industry, highlighting key trends across species, regional challenges and opportunities for growth.

Region	Total Feed Tonnage	Growth from 2023
Asia-Pacific	533,137	-0,8%
North America	290,755	0,6%
Europe	267,399	2,5%
Latin America	199,083	3,6%
Africa	57,787	7,2%
Middle East	37,682	2,8%
Oceania	10,972	2,5%
Всего	**1 396,815**	**1,2%**

2024 Feed Tonnage by Region *All numbers are in million metric tons

AQUACULTURE

Global feed production for the aquaculture sector declined slightly (by 1.1%), continuing a downward trend for the sector that first emerged in 2023. This statistic, however, conceals considerable regional divergence, including gains in Latin America, Africa and Europe. Unfortunately, the considerable decreases in Asia-Pacific and North America weighed down the entire sector.

Africa and the Middle East: Production experienced a 9.1% increase in Africa. While the overall volumes remain small, more farmers are adopting commercial aquafeeds in their operations, and rising demand for lower-cost proteins also benefited the sector. Tonnage was down by 0.6% in the Middle East, but aquaculture is still faring well in the region as a whole.

Asia-Pacific: Persistent challenges led to an overall decrease of 1.7% in the production of aquaculture feed in Asia-Pacific. While the region is still the largest aquaculture producer in the world, aqua feed production has now decreased there for two consecutive years due to environmental challenges, disease outbreaks and economic pressures. Operational shifts, such as the move to cheaper feed alternatives and challenges with the broodstock supply, have further reduced the need for specialized feeds.

Europe: The sector has demonstrated resilient growth over the past five years, with a 2.1% rise in feed production continuing that upward trend. This increase is underpinned by strategic adaptations to sustainability demands, technological advancements and market dynamics. Atlantic salmon, sea bass and sea bream — species with strong European production bases — are driving growth by commanding premium prices around the world.

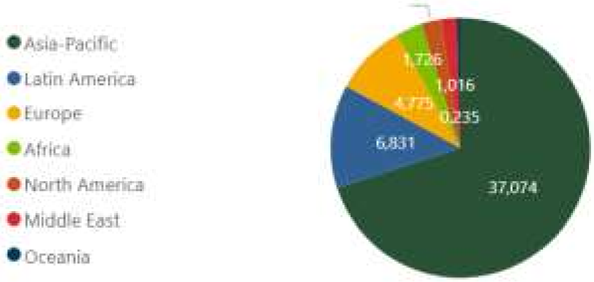
Latin America: The sector declined by 2.3%, mainly due to new import tax regulations and declining shrimp feed usage in Ecuador. Despite those setbacks, other Latin American countries — like Chile and Peru — benefited from favorable biological conditions that helped boost aquaculture yields, including cooler water temperatures. Additionally, government incentives promoting aquaculture in countries like Brazil and Chile, including subsidies for feed production and support for export activities, could help drive recovery in the coming years.

North America: Feed tonnage fell by 3.7% in North America on the heels of multiple headwinds for the industry. Salmon producers were challenged by sea lice and winter sores, while shrimp production has reached an oversupply, limiting feed demand. Some producers scaled down due to weak margins, especially on the U.S. Gulf Coast. The industry is currently in a state of unease, as the largest shrimp farmer in the United States filed for bankruptcy in early 2025.

Oceania: Feed production experienced a high growth rate of 9.3% in Oceania due to the debut of new aquaculture operation sites and broadening species portfolios. Expansion has also been driven by government interest in the sector and by the market's adjacency to Asia-Pacific.

Region	Total Feed Tonnage	Growth from 2023
Asia-Pacific	37,074	-1,7%
Latin America	6,831	-2,3%
Europe	4,775	2,1%
Africa	1,726	9,1%
North America	1,309	-3,7%
Middle East	1,016	-0,6%
Oceania	0,235	9,3%
Всего	**52,966**	**-1,1%**

2024 Feed Tonnage by Region *All numbers are in million metric tons



BEEF

Beef feed tonnage rose from 131.6 million mt in 2023 to 134.7 million mt, reflecting a 1.8% global increase. North America, Latin America, Africa, Europe and Oceania all recorded gains thanks to a rise in demand for beef exports due to tight supply elsewhere around the world. Additionally, scarce forage in parts of North America, Latin America and Australia drove cattle producers to rely more heavily on commercial feed.

Africa and the Middle East: Beef feed production fared very well in Africa, with a 32.2% gain. This notable increase likely stemmed from widespread transitions to more commercialized systems, rising urban demand for beef and a greater reliance on purchased feeds.

Asia-Pacific: The 6.0% decline in beef feed production in Asia-Pacific (from 21.0 million tons to 19.8 million tons) exemplifies the persistent challenges the sector faced in 2024, including disease outbreaks and economic factors. China experienced its first annual decline in beef production since 2013 due to lower prices and herd liquidation.

Europe: Beef feed production recorded a healthy 2.2% increase in Europe, but a long-term herd decline still looms over the region. This year's temporary growth can be explained by price-driven intensification and sustainability schemes in Ireland and France, short-term gains due to higher beef prices, weather-forced reliance on compound feeds and a surge in beef exports.

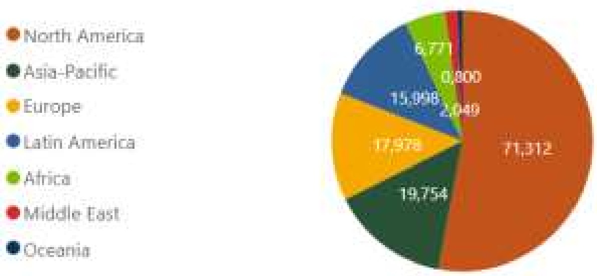
Latin America: Beef feed tonnage saw the largest increase (4.5%) of any sector in Latin America, fueled by global beef shortages and export opportunities. Brazil and other countries capitalized on global beef supply constraints — most notably in the U.S. — with increased exports, boosting feedlot activity.

North America: The North American beef sector grew by 1.3% thanks to an increase in feed demand as the result of drought conditions and stable herd sizes. While U.S. beef and dairy cow slaughter fell by 14% in 2024, beef demand reached its highest level since 1986.

Oceania: Beef feed production enjoyed a great year in Oceania, marking an 11.1% increase. Australia produced a record 2.57 million mt of beef due to dry conditions that encouraged earlier feedlot finishing. Strong global demand also spurred higher exports.

Region	Total Feed Tonnage	Growth from 2023
North America	71,312	1,3%
Asia-Pacific	19,754	-6,0%
Europe	17,978	2,2%
Latin America	15,998	4,5%
Africa	6,771	32,2%
Middle East	2,049	-0,3%
Oceania	0,800	11,1%
Всего	**134,663**	**1,8%**

2024 Feed Tonnage by Region *All numbers are in million metric tons



BROILERS

Broiler feed remains the largest species segment, accounting for 27.6% of total global feed production. Despite health and cost challenges, production grew 1.9% to 385.4 million mt, driven by affordability and strong demand in Asia-Pacific, Latin America and Africa.

Africa and the Middle East: Production increased in Africa and the Middle East — 2.6% in Africa, an increase of 0.454 million mt and 9.2% in the Middle East, an increase of 1.094 million mt. Steady growth in the Middle East was somewhat tempered by water scarcity and import costs, but broiler feeds have a substantial potential for expansion due to continued population growth and the preference for poultry as a low-cost protein.

Asia-Pacific: The 0.6% increase in broiler feed volumes (to 161.473 million mt) in Asia-Pacific was attributed to oversupply adjustments, elevated production costs and disease pressures in key markets. Economic uncertainty reduced demand for broiler meat in some countries, where consumers pivoted to purchasing eggs; elsewhere, rising incomes increased the domestic demand.

Europe: The European broiler feed sector grew by 1.8% due to increases in chicken-meat production in Eastern and Southern Europe, as well as rising exports and growing consumer demand for poultry meat. With its relative affordability and the perceptions of sustainability and health, broiler production is expected to continue faring well in Europe.

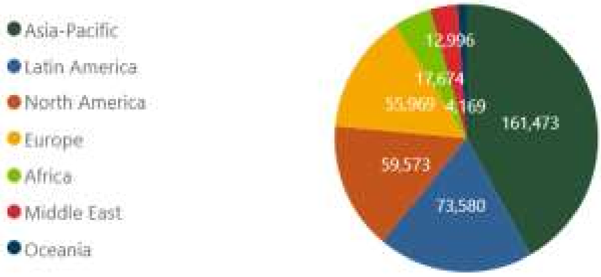
Latin America: Broiler feed tonnage increased by 3.6% in Latin America, reflecting strong domestic consumption and export growth. Consumers are choosing chicken over other proteins due to economic challenges. Lower feed costs, mainly due to a decline in corn and soybean prices, supported higher production margins; the cost of feed for broiler chickens in Brazil, for instance, decreased by an average of 7.9% between 2023 and 2024.

North America: The 1.3% growth (or 59.6 million mt) seen in the North American broiler feed sector can be attributed in part to higher beef prices, which led food retailers to promote chicken meat as a more affordable alternative. In the U.S., poultry is becoming even more affordable, with chicken prices increasing at a slower rate than inflation.

Oceania: The broiler sector is still the largest in both Australia and New Zealand, accounting for 38% of total commercial feed tonnage (slightly down from 38.2% in 2023). However, this growth rate was outpaced by beef, pet and aquaculture in the region in 2024. As consumer demand and feedlot investments stay steady, broiler feed production is anticipated to grow at a modest pace.

Region	Total Feed Tonnage	Growth from 2023
Asia-Pacific	161,473	0,6%
Latin America	73,580	3,6%
North America	59,573	1,3%
Europe	55,969	1,8%
Africa	17,674	2,6%
Middle East	12,996	9,2%
Oceania	4,169	2,0%
Всего	**385,433**	**1,9%**

2024 Feed Tonnage by Region *All numbers are in million metric tons



DAIRY

The global dairy sector made unexpectedly strong gains, growing by 3.0% (or 5.1 million mt). Robust consumer demand, favorable milk prices and a shift toward more intensive farming practices largely fueled this expansion, with Asia-Pacific, Europe, Africa and Latin America all displaying growth. While dairy feed production remained stable in North America, Oceania's reliance on abundant pasture led to a slight dip in its feed tonnage.

Africa and the Middle East: While dairy feed was mostly static in the Middle East, the sector leapt up by 25.7% in Africa thanks to growing urban populations and improving cold-chain logistics. More smallholder dairy farms in the region are shifting from purely pasture-based systems toward commercial operations, which increases their reliance on formulated dairy rations and drives up feed tonnage.

Asia-Pacific: Dairy feed emerged as a resilient growth driver for all agri-food production in Asia-Pacific, with an increase of 2.4%. The region's dairy sector has been experiencing structural changes, with growing domestic consumption and an increase in export potential driving demand. The intensification of the industry has led to a notable shift from smallholder, subsistence dairy farming to larger commercial operations.

Europe: Dairy feed production rebounded in Europe, rising by 4.1% after four years of decline. This recovery was driven by market incentives and strategic investments, which outweighed challenges like disease outbreaks and climate pressures. Milk production expanded in Eastern European countries, including Poland and Hungary, thanks to more efficient, larger-scale farms, offsetting declines in Western Europe.

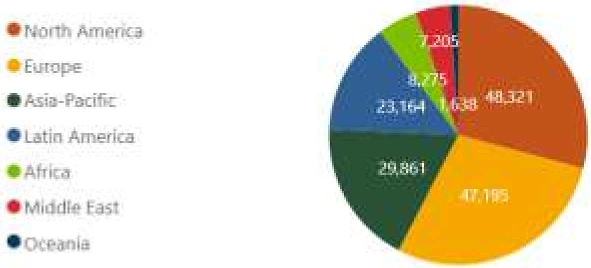
Latin America: Dairy feed production rose by 3.8% in Latin America thanks to improved milk prices and an increased reliance on supplemental feeds after droughts. Larger dairies in Brazil, Argentina and Mexico are making structural changes, with a focus on modernization and investing in concentrated rations for a higher milk output.

North America: North American dairy feed tonnage stayed relatively flat, with a small decline of 0.5%. This can be attributed to regional variabilities, health challenges and economic conditions. Despite higher milk prices serving as an incentive to boost production, the potential economic benefits were outweighed by high costs for replacement cows and the ongoing impact of HPAI.

Oceania: While Oceania experienced one of its biggest milk production seasons in many years, the dairy sector still displayed a decrease of 0.4% — in light of strong grass growth and pasture management in New Zealand.

Region	Total Feed Tonnage	Growth from 2023
North America	48,321	-0,5%
Europe	47,195	4,1%
Asia-Pacific	29,861	2,4%
Latin America	23,164	3,8%
Africa	8,275	25,7%
Middle East	7,205	-0,2%
Oceania	1,638	-0,9%
Bcero	**165,660**	**3,0%**

2024 Feed Tonnage by Region *All numbers are in million metric tons



EQUINE

Equine feed tonnage increased 2.3%. This growth was driven by premiumization trends and rising interest in nutrition-focused care. The sector faces declining populations and high feed costs. Globally, equine feed tonnage increased (+2.3%) in all but one region, largely due to steady or expanding participation in equestrian activities, increasing awareness of equine nutrition and wider availability of specialized feeds.

Africa: The development of nascent equestrian sports and horse-related tourism led to an increase in feed production. Better infrastructure and the presence of more local feed mills led to a consistent supply of formulated equine feeds, which allowed owners to switch from traditional forages to mixed or concentrated feeds.

Asia-Pacific: Countries like China, India and parts of Southeast Asia are seeing increased interest in horse racing and equestrian clubs. Even a modest uptick in horse populations can drive feed demand. As with other livestock sectors, a growing middle class may increase spending on leisure activities, including horse ownership and riding clubs.

Europe: Feed production increased 5.3%, driven by a strong equine culture and long-established equestrian traditions, including dressage, eventing and racing. Many European horse owners invested in higher-quality feeds that emphasize advanced nutrition, pushing up total feed volume and value.

Latin America: Growth in Latin American equine feed production was driven by expanded sports and breeding programs in Brazil, Argentina and Mexico, the popularity of tourism and leisure riding throughout Latin America, and new export opportunities.

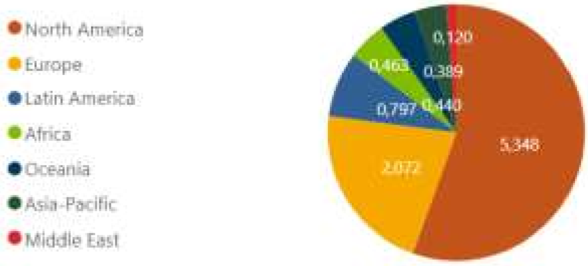
Middle East: Feed production was down due to market fluctuations, a slowdown in imports and cost sensitivity that caused some horse owners to switch to cheaper local forages.

North America: Though it is one of the largest markets for equine feed, North America's market is also very mature, so its growth tends to be more modest. Feed production increased slightly, driven by a steady horse population and the ongoing popularity of horse racing, rodeo and other equine sports.

Oceania: A strong horse-racing culture and the popularity of recreational riding and equestrian sports supported a 2.3% increase in feed production.

Region	Total Feed Tonnage	Growth from 2023
North America	5,348	0,8%
Europe	2,072	5,3%
Latin America	0,797	4,3%
Africa	0,463	4,5%
Oceania	0,440	2,3%
Asia-Pacific	0,389	2,2%
Middle East	0,120	-0,4%
Всего	**9,630**	**2,3%**

2024 Feed Tonnage by Region *All numbers are in million metric tons



LAYERS

While the poultry sector retained its place as the top feed segment in the world, the slow 1.4% growth rate in layer feed production reflected the challenges facing the industry, including disruptions by avian influenza and oversupply in some regions.

Africa and the Middle East: Modest growth in Africa (of 1.7%) was canceled out by a decline in the Middle East (of 1.1%), leaving layer production relatively static there in 2024. In Africa, the sector benefited from lower raw material costs, and egg consumption is on the rise because of its affordability. In the Middle East, however, gains in the United Arab Emirates were tempered by poor availability, import costs and geopolitical conflicts. With the African layer industry still relatively underdeveloped, the industry has a great potential for expansion across the region.

Asia-Pacific: As the world's largest layer producer, Asia-Pacific recorded growth of 2.4% (to 82.956 million mt). Egg sales rose in India and parts of Southeast Asia as meat prices increased and demand grew among urban populations. The region might have achieved even higher levels of success if not for outbreaks of HPAI and a downturn of 1.0% in China.

Europe: The European layer sector was down slightly (-0.4%). Consumer demand for healthy and sustainable protein, profitable margins and operational efficiencies boosted production in many European markets — but that growth was overshadowed by the severe contraction of the layer industry in Türkiye, which shrunk by 15%.

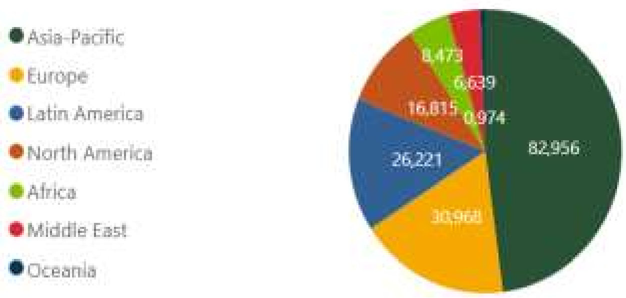
Latin America: Layer feed production grew by 4.7% in Latin America due to robust domestic demand and favorable economic conditions. Layer production grew faster than any other sector in Mexico thanks to its dominance as the country's No. 1 choice of protein.

North America: HPAI's stark impact was on display in North America, where layer feed production decreased by 4.2%. Market trends and changing consumer demand also contributed to this decline, but HPAI was the main culprit, leading to the loss of millions of table-egg-laying hens and pullets.

Oceania: Despite the devastating effects of HPAI — which led to nearly 10% of Australia's flock being culled — the layer sector in Oceania was still able to record growth of 3.4%. Stable consumer demand for eggs and expansions of large free-range operations in some areas kept the region's layer feed production on track.

Region	Total Feed Tonnage	Growth from 2023
Asia-Pacific	82,956	2,4%
Europe	30,968	-0,3%
Latin America	26,221	4,7%
North America	16,815	-4,2%
Africa	8,473	1,7%
Middle East	6,639	-1,1%
Oceania	0,974	3,4%
Всего	**173,047**	**1,4%**

2024 Feed Tonnage by Region *All numbers are in million metric tons



PETS

Pet food tonnage soared 4.5% globally, fueled by continued trends toward premiumization (including functional diets and the "humanization" of pets), expanded pet ownership and continued innovation in the sector's product offerings. While the increase in pet food production appears to have slowed somewhat last year, it still remains one of the fastest-growing sectors in the world.

Africa and the Middle East: The pet food sector enjoyed unfettered growth across this region, including a rise of 0.95% in the Middle East and an astounding 60.3% jump in Africa. More and more households are adopting companion animals — particularly dogs — thanks to growing incomes and urbanization in certain African markets.

Asia-Pacific: The pet food and supplement production sector has exhibited significant consecutive growth in Asia-Pacific, with a notable 11.0% increase. This success has been driven in part by rising pet ownership, which grew by 12–15% in India, and increasing demand for high-quality pet foods. Robust exports also played a role, underscoring the region's growing role in the global pet food supply chain and reinforcing its position as a dynamic market.

Europe: The European pet food sector saw modest overall growth (+1.6%), but the regional disparities were stark — with France declining by 8%, for instance, while Spain and Ireland achieved double-digit growth. This divergence reflects contrasting economic conditions, consumer trends and market strategies.

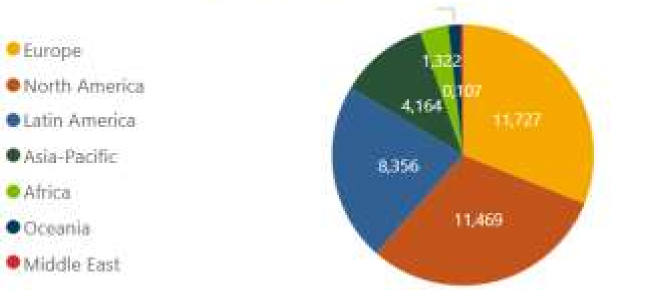
Latin America: Rising pet ownership and premiumization trends led to a 2.8% increase in pet food production in Latin America. The region has continued to benefit from a spike in pet ownership, leading to increased demand for pet food and supplements. Interest in functional and health-oriented pet food products is also on the rise — and pet owners are increasingly aware of the health benefits of supplements for their pets, including those for joint health, skin and coat health, and overall vitality.

North America: The pet food sector in North America exhibited continued stability with an increase of 2.3%. This growth can be attributed to rising pet ownership and demand for high-protein, functional diets. Pet owners across the region are increasingly willing to spend more on high-quality, tailored pet food options — as illustrated by the fact that sales of premium pet products in North America rose by 11.7%.

Oceania: The pet food sector is growing in Oceania, which recorded an increase of 7.4% in tonnage. New Zealand's and Australia's pet owners have exhibited a strong interest in high-quality, locally sourced feeds, and that prioritization of premium products promises to carry the region's pet food sector forward to a successful 2025.

Region	Total Feed Tonnage	Growth from 2023
Europe	11,727	1,6%
North America	11,469	2,3%
Latin America	8,356	2,8%
Asia-Pacific	4,164	11,0%
Africa	1,322	60,3%
Oceania	0,580	7,4%
Middle East	0,107	0,9%
Всего	**37,724**	**4,5%**

2024 Feed Tonnage by Region *All numbers are in million metric tons



PIGS

The pig sector was one of just two major global feed production sectors that experienced a net loss in 2024, declining by 0.7%. Growth in the European, Latin American and North American pork segments was counterbalanced by downturns in Africa and the Middle East, Asia-Pacific and Oceania.

Africa and the Middle East: The 5.8% decline in African pig feed production was attributed to economic instability, high input costs and regulatory headwinds. The continent has also struggled to recover from the effects of ASF, and both local and global conflicts continue to strain all segments of agri-food production.

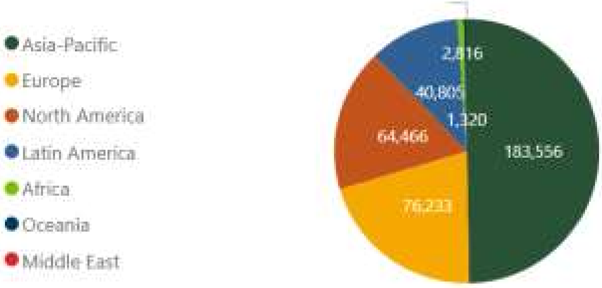
Asia-Pacific: Pig feed production decreased by 3.3% across Asia-Pacific due to the lingering effects of ASF, economic pressures and industry-wide shifts toward local production over imports. China, which generally contributes more than 78%
of the region's total pig feed tonnage, experienced a decline for the first time in three years after struggling w oversupply and slower sow replenishment.

Europe: European pig feed production increased by 2.2%, reversing a two-year decline. Producers benefited from lower feed prices across the region. Additionally, while ASF has reduced herds and production in recent years, European producers bounced back well from disease challenges, with increasing pig populations leading to higher demand for feed.

Latin America: Pork feed tonnage grew 3.8% in Latin America due to lower feed costs and record exports. Domestic demand also increased in the region as consumers favored pork over beef for its cost-effectiveness. While some markets struggled with the effects of outbreaks of porcine reproductive respiratory syndrome (PRRSv), record-high exports recorded in Brazil picked up the slack, and export opportunities will continue to play a role.

Region	Total Feed Tonnage	Growth from 2023
Asia-Pacific	183,556	-3,3%
Europe	76,233	2,2%
North America	64,466	1,4%
Latin America	40,805	3,8%
Africa	2,816	-5,8%
Oceania	1,320	-0,8%
Middle East	0,007	0,0%
Всего	**369,203**	**-0,7%**

2024 Feed Tonnage by Region *All numbers are in million metric tons



North America: Stabilized breeding herds and heavier hog weights paved the way for a 1.4% increase in pig feed production in North America after two years of declines. While droughts and market conditions led to slight downturns in the pig population and production in Canada (by 0.2%), the U.S. sector remained resilient.

Oceania: While pig feed production remained stable in Australia, the pork sector was down 0.8% for Oceania as a whole due to a 7% drop in New Zealand.

Feed Mills by Region

Asia-Pacific leads the way with 584 new mills

The number of feed mills continued to increase globally, with more than 420 new mills. Increases in Latin America and Asia-Pacific offset the net decrease in feed mills in Europe and North America. China's significant increase in feed mills is particularly noteworthy because the country simultaneously experienced a slight decrease in overall feed production (Tabl 1).

This reflects China's strategic industry restructuring, with major companies investing in high-capacity, technologically advanced facilities, while older, less efficient operations are phasing out. These new mills often focus on higher-quality specialty feeds, regional distribution optimization and vertical integration strategies, positioning China's feed industry for future growth despite short-term production adjustments in specific livestock sectors.

The top 10 countries in terms of feed tonnage did not change significantly in 2024 (Tabl 2): Türkiye moved up from No. 10 to No. 9, surpassing Japan. Despite significant volume changes, the other top 10 countries remained in the same positions.

Altogether, the **top 10 countries account for 65.6% of the world's 2024 feed production** (versus 66.0% in 2023), and they can be viewed as an indicator of the trends in agriculture. About 52% of global feed consumption is concentrated in four countries: China, the U.S., Brazil and India.

Tabl 1 - Volumes of compound feed production in 2024 by region

Region	Number of mills, 2024	Number of mills, 2023 (updated)	Difference
Africa	2,228	2,188	40
Asia-Pacific	8,211	7,627	584
Europe	6,252	6,421	-169
Latin America	4,426	4,356	70
Middle East	844	872	-28
North America	6,069	6,143	-74
Oceania	200	195	5
Grand Total	**28,230**	**27,802**	**428**

Tabl 2 - Top 10 Feed-Producing Countries

Top countries	2024 feed tonnage (million mt)	2023 feed tonnage (million mt) – updated	Growth (million mt)	Growth %	Rank, 2024	Rank, 2023
China	315.030	321.548	-6.518	-2.03%	1	1
U.S.	269.620	267.787	1.834	0.68%	2	2
Brazil	86.636	84.581	2.055	2.43%	3	3
India	55.243	52.834	2.409	4.56%	4	4
Mexico	41.401	40.837	0.564	1.38%	5	5
Russia	38.481	35.456	3.025	8.53%	6	6
Spain	35.972	35.455	0.517	1.46%	7	7
Vietnam	25.850	24.997	0.853	3.41%	8	8
Türkiye	24.502	23.374	1.128	4.83%	9	10
Japan	24.297	24.264	0.033	0.14%	10	9

A Closer Look at the Top Feed-Producing Countries

No. 1 — China

Despite China's total feed amounting to 315.0 million mt in 2024, its animal feed sector declined by 2.0% year over year (a decrease of 6.5 million mt).

This was driven mainly by decreases in pig, beef, dairy and aquaculture feed usage due to oversupply, weak prices and disease challenges. However, broiler feed grew robustly (+2.6%), and pet food grew by 10.3%.

Though overall feed production was down slightly, China added 475 new feed mills, strategically restructuring its feed industry through: high-capacity, technologically advanced facilities; regional distribution optimization; and specialty feed production. The country's feed mill expansion reflects its national food security priorities: record grain harvests; supply chain control; and reduced dependence on imports. Many of the new mills focus on higher-quality, premium feed products — and many represent downstream expansion by agricultural conglomerates seeking greater control.

Overall, China's feed landscape remains vulnerable to price swings, disease and farm consolidation — but large integrators and high-value segments may see more resilient expansions.

Total feed tonnage: 315.0 million mt

Feed production growth:

• Broiler — 2.6%

• Pet — 10.3%

Notable decreases:

• Major decreases in beef (-12.2%) and dairy (-13.9%)

• Pig feed production declined (-3.9%) for the first time in three years due to ongoing oversupply and slower sow replenishment in 2024.

Challenges:

• Disease management

• Price fluctuations

• Farm consolidation

No. 2 — United States

The U.S. maintained its position as the world's second-largest feed producer, with total animal feed production reaching 269.6 million mt, a 0.7% increase over 2023. This was driven largely by pig and broiler sector growth.

Beef feed demand remained strong due to record-high prices and tight cattle supplies, though feed tonnage is expected to decline as herd rebuilding begins. The pork sector showed cautious optimism, with lighter dressed weights and global trade uncertainties impacting production. Poultry faced challenges from HPAI, driving egg prices up over 20%, while broiler feed demand stayed resilient. Dairy feed tonnage remained flat, with steady cow numbers and improved margins supporting production.

Other sectors, like sheep and goat feed, grew 2% due to rising demand, while aquaculture faced setbacks with the bankruptcy of a major shrimp producer. Overall, the U.S. feed industry remains robust, navigating challenges like disease outbreaks, trade dynamics, and shifting consumer demands.

Total feed tonnage: 269.6 million mt

Feed production growth:

• Beef — 1.3%

• Pet — 2.0%

• Broiler — 1.4%

• Equine — 0.8%

No. 3 — Brazil

Brazil kept its position as the world's thirdlargest feed producer, with animal feed production reaching 86.6 million mt there in 2024, a 2.4% increase from 2023. All sectors experienced growth, except equine, which remained steady.

The poultry sector expanded due to Brazil's dominance in global chicken exports and rising domestic demand for affordable protein. Beef production is expected to contract due to reduced cow inventories, though exports remain strong, particularly to China and the U.S. The dairy industry saw modest growth, with a shift toward more efficient, technology-driven farms, while pork exports hit record highs, supported by declining beef supplies.

Brazil's agriculture sector remains resilient, with strong export demand counterbalancing production challenges in beef and dairy.

Total feed tonnage: 86.6 million mt

Feed production growth:

• Beef — 7.0%
• Pet — 3.4%
• Broiler — 1.6%
• Layer — 6.5%

Notable trends among the remaining top feedproducing Countries

No. 4 — India

Total animal feed production increased 4.6%, with poultry and dairy as the primary drivers of this growth. The dairy sector experienced significant growth (+11.1%) because of rising demand, government support and infrastructure investments, and robust exports. The layer sector grew by 4.6% due to high consumer demand for eggs. Pet ownership in India is growing at a rate of 12–15%, driven by rising income levels.

No. 5 — Mexico

Animal feed production totaled 41.4 million mt, an increase of 1.4%. All feed sectors, except pig, grew in 2024. The pig sector decline was due to the import of pork from the U.S. and the impact of local diseases. Mexico's layer sector showed the most growth due to increased domestic consumption of this first-choice protein in the country, especially amid economic pressures.

No. 6 — russia

Animal feed production increased by 3.0 million mt, an increase of 8.5%. Over two-thirds of the country's feed production growth can be attributed to the pig sector, which grew over 2 million metric tons. Russia has prioritized pig farming to enhance agricultural self-sufficiency and reduce its reliance on pork imports. Government subsidies and support programs have spurred herd expansion, while recovery from past challenges has stabilized production, driving significant feed demand. Russia's animal feed production is poised to continue growing, particularly in the pig, poultry and dairy sectors.

No. 7 — Spain

Total animal feed production increased 1.5%, fueled by steady pork demand, rising poultry consumption and a pet ownership boom. The rise in poultry feed, particularly for broilers (+7.8%) and layers (+5.3%), reflects growing consumer demand for chicken and eggs. Poultry is often a more affordable protein source compared to pork or beef, making it attractive amid economic pressures.

Spain is a major pork producer in Europe, and the modest increase (+1.1%) in pig feed production reflects steady domestic and export demand, alongside a slight recovery from porcine reproductive and respiratory syndrome (PRRS).

Sustainability efforts in beef and dairy production are also intensifying, with efforts focused on improving farm efficiency, controlling slurry emissions and incorporating methane inhibitors to reduce environmental impact.

No. 8 — Vietnam

Feed production is experiencing a steady upward trend, with total feed tonnage increasing by 3.4%. Media sources in Vietnam report the domestic feed industry's growth will likely continue in future years due to increasing demand as well as supportive government policies. Dairy feed production saw the highest percentage increase (+36%), fueled by rapid expansion in the sector, a growing middle class with higher disposable income and an increasing appetite for dairy products like milk and cheese.

There was also steady growth in the aquaculture sector, with an increase of 3.3% in feed production. Aqua accounts for 16.8% of Vietnam's total feed production.

No. 9 — Türkiye

Feed production saw robust overall growth (+4.8%), driven primarily by the dairy sector, which surged by 21.33%. This growth was attributable to the increase in the number of heifers and their calves brought from abroad. The pressure feed companies put on farmers to buy feed is also a factor. Conversely, the poultry sector faced a significant setback, declining by 7.4%, with the layer subsector dropping sharply by 14.9%, due to HPAI outbreaks, currency volatility, higher input costs, geopolitical tensions and a dependence on imported feed ingredients.

No. 10 — Japan

Feed production was nearly flat, with a 0.1% growth. A decline in the pig sector was offset by growth in the poultry sector, as consumers looked for less expensive animal proteins. Pig slaughter numbers remained flat, caused by the long-term impact of last year's hot summer weather. Some factors causing slight growth in slaughter numbers include the continued high feed costs and disease outbreaks that caused small producers to leave the industry.

Received 29.04.2025 **Revised 15.06.2025**
Reviewed 03.06.2025 **Approved 02.12.2025**

Cite as Vancouver Citation Style

Alltech. Agri-Food Outlook 2025. Global overview . P2. Grain Products and Mixed Fodder's, 2025; 25 (4, 100): 19-28. DOI https://doi.org/10.15673/gpmf.v25i4.3312

Cite as State Standard of Ukraine 8302:2015

Alltech. Agri-Food Outlook 2025. Global overview. P2. // Grain Products and Mixed Fodder's. 2025. Vol. 25, Issue 4 (100). P. 19-28. DOI https://doi.org/10.15673/gpmf.v25i4.3312