



UDC 636.



DOI <https://doi.org/10.15673>

Alltech, <https://www.alltech.com/>

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GLOBAL FEED PRODUCTION REMAINS STEADY IN 2022



FEED, QUALITY, TECHNOLOGY AND ANIMAL FEED

GLOBAL OVERVIEW

Feed production remains steady in 2022

Global feed production remained steady in 2022 despite significant macroeconomic challenges that affected the entire supply chain. Europe bore the brunt of the impact, including significant disease challenges, severe weather and the impacts of the invasion of Ukraine.

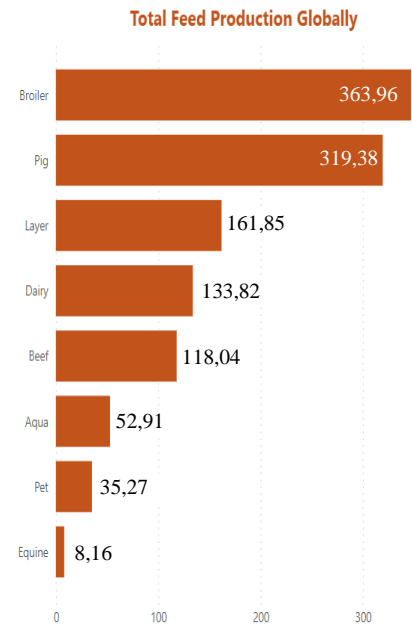
Alltech's Agri-Food Outlook estimates that global feed tonnage totaled 1.266 billion metric tons (BMT) in 2022, a decrease of less than one-half of one percent from 2021's estimates. The annual survey includes data from 142 countries and more than 28,000 feed mills.

Feed production increased in several regions, including Latin America (1.60%), North America (0.88%) and Oceania (0.32%). As a result of improvements in the scale and accuracy of our sources in the Middle East, our 2022 feed production numbers were nearly 25% higher than they were in 2021.

Feed production in Europe decreased by 4.67% and was down by 3.86% in Africa. Production in the Asia-Pacific region also dropped 0.51%. **Increases in feed tonnage were reported in the aquaculture, broiler, layer and pet food sectors, while decreases were reported in the beef, dairy and pig sectors.**

Inflation and the overall state of the economy were cited as the biggest challenges affecting the agri-food sector in 2022.

- China remained the largest feed-producing country in the world in 2022, followed by the United States and Brazil.
- Supply chain disruptions remain an obstacle for the agri-food industry across all regions.
- Animal diseases have disrupted feed production in more than 80% of countries.



*All numbers are in million

Region	Total Feed Tonnage	Growth from 2021	2022 Feed Tonnage by Region
Oceania	10,47	0,32%	
North America	261,64	0,88%	
Middle East	31,79	24,73%	
Latin America	190,91	1,60%	
Europe	263,22	-4,67%	
Asia-Pacific	465,54	-0,51%	
Africa	42,79	-3,86%	
Усього	1 266,35	-0,42%	

*All numbers are in million metric tons



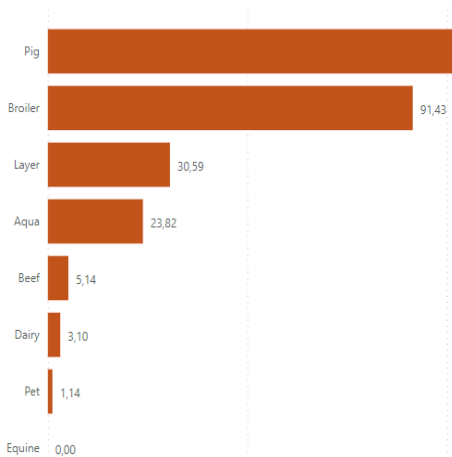
Top 10 countries

Together, the top 10 countries consume 64% of the world's feed, and half of the world's global feed consumption is concentrated in four countries: China, the U.S., Brazil and India.

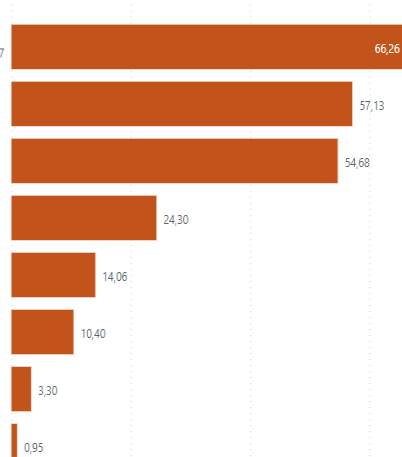
Vietnam experienced a great recovery in terms of its feed tonnage in 2022, entering the top 10 ahead of Argentina and Germany and crowding out Turkey, which reported reduced feed tonnage. Russia overtook Spain, where there was a significant reduction in feed production.

Country	Sum of 2021 total feed production (MMT*)	Sum of 2022 total feed production (MMT)	Growth (MMT)	Growth %
China	268.343	260.739	(7.604)	-2.83%
United States	237.977	240.403	2.426	1.02%
Brazil	81.239	81.948	0.709	0.87%
India	44.059	43.360	(0.700)	-1.59%
Mexico	39.684	40.138	0.454	1.14%
Russia	33.000	34.147	1.147	3.48%
Spain	35.838	31.234	(4.604)	-12.85%
Vietnam	20.920	26.720	5.800	27.72%
Argentina	26.719	25.736	(0.983)	-3.68%
Germany	24.506	24.396	(0.110)	-0.45%

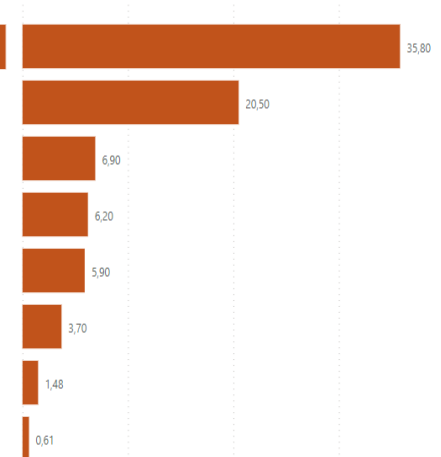
Total Feed Production for China



Total Feed Production for USA



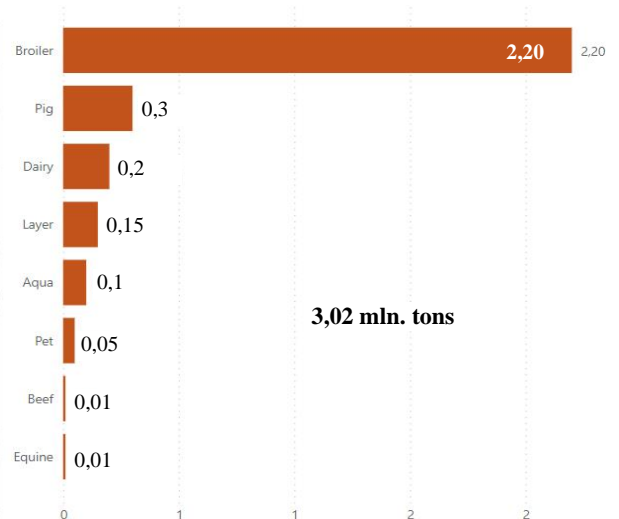
Total Feed Production for Brazil



Ukraine



Total Feed Production for Ukraine



3,02 mln. tons

*All numbers are in million metric tons

According to the materials of the Alltech company



Feed mills

As consolidation continues, the number of feed mills continues to decrease and output by large feed mills continues to rise. The number of total feed mills in 2022 was down slightly, about one half of one percent, from 2021.

The biggest reductions in feed mill numbers were seen in Europe, specifically in Spain, Poland, Ukraine, Russia and Hungary. Feed mill numbers in some African countries (Ghana, Mozambique and Namibia) were previously underreported, when only the largest feed mills were included in the survey.

FEED, QUALITY, TECHNOLOGY AND ANIMAL FEED

Country	Count of mills, 2021	Count of mills, 2022	Growth	Growth %
Africa	2,309	2,357	48	2.08%
Asia-Pacific	6,989	7,146	157	2.25%
Europe	6,970	6,553	(417)	-5.98%
Latin America	4,765	4,806	41	0.86%
Middle East	795	799	4	0.50%
North America	6,280	6,300	20	0.32%
Oceania	194	195	1	0.52%
Grand Total	28,302	28,156	(146)	-0.52%

Feed production estimates by sector

Globally, feed tonnage increased in the broiler, layer, aquaculture and pet food sectors. Volume growth in feed tonnage came predominantly from the broiler feed sector. Percentage wise, the biggest growth was in pet food. The pig, dairy and beef sector experienced decreased feed tonnage.

1.

Avian influenza, other diseases and the high costs of raw materials affected the layer sector in many markets, especially in Asia, Europe and Africa. On the other hand, growth in the sector was boosted due to bigger challenges in other sectors that led to increased demand for eggs. Overall, layer-sector feed production increased by just one-third of 1%.

LAYERS



Africa: Kenya reported a 42.5% (0.3 MMT) reduction in layer feed tonnage because of high production costs. Over 40 layer producers have closed their operations there in recent months.

Asia-Pacific: Although the 2022 price for eggs was relatively high in China, the feed material cost (maize and soybean meal) was prohibitive to layer production. The number of laying hens in stock in 2022 decreased significantly compared with 2021. Layer feed tonnage was down 3%, or a reduction of 1 MMT. In the Philippines, layer feed production increased 28% because ASF prompted conversions from swine production to layer and broiler farms. India reported an 8% decrease in layer feed tonnage because many small layer farms shut down.

Europe: Europe witnessed a tight poultry market with a strong price. Poultry production is expected to drop, keeping prices high, because of ongoing avian influenza pressure and high input cost. For UK poultry, declining self-sufficiency is expected to continue in 2023.

Latin America: Feed value increased because countries such as Argentina increased egg production. In Brazil, the rise of the raw materials prices and the slow increase of final prices put the egg industry in a difficult situation. Demand was slower and prices were higher. In 2021, there was a decrease in the number of breeders, which continued to affect the industry in 2022, but a recovery is expected by the end of 2023.

Middle East: Feed production increased nearly 8%.

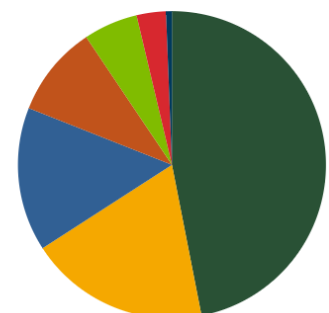
North America: Layers were more affected by avian influenza than any other poultry species in the U.S in 2022. More than 57 million commercial birds in the U.S. were affected, mostly layers and turkeys.

Oceania: Layer feed production climbed nearly 3%, with nearly every country increasing in feed tonnage.

Region	Total Feed Tonnage	Growth from 2021
Asia-Pacific	75,94	-0,71%
Europe	30,67	-1,02%
Latin America	24,51	3,71%
North America	15,53	2,71%
Africa	9,22	-3,36%
Middle East	4,98	7,70%
Oceania	1,00	2,98%
Усього	161,85	0,31%

2022 Layers by Region

- Asia-Pacific
- Europe
- Latin America
- North America
- Africa
- Middle East
- Oceania



*All numbers are in million metric tons

2.

BROILERS



While the overall tonnage in the broiler sector increased by about 1.3%, there were significant differences from country to country. Overall, feed production growth in the broiler sector was reported mainly from the Middle East, North America and Latin America.

Global poultry markets are expected to stay strong in 2023 but may have some price and volume swings depending on the region.

Africa: There were increases in broiler feed tonnage in some countries, but those were offset by a big reduction in Kenya, where feed production dropped over 44%.

Asia-Pacific: Broiler feed production decreased in China but increased in Vietnam. In China, production was affected by low market demands and high raw materials prices. In India, higher broiler feed prices continue to challenge the industry's margins and limit capacity growth. Avian influenza affected India, Japan, Korea and Vietnam. Feed production in the Philippines increased significantly, due to a switch from pig farming to broilers because of African swine fever (ASF).

Europe: Poultry production in Europe was significantly affected by avian influenza and the high price of raw materials and energy.

Latin America: Brazil and Mexico, which represent most of the market for broilers in Latin America, had steady numbers from 2021 to 2022.

Middle East: In Saudi Arabia, local broiler production is expanding to lower the country's dependence on chick imports.

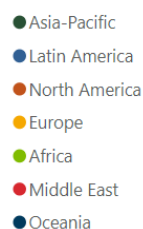
North America: Broiler feed production was up over 3% and broiler exports were flat. Broiler production is growing slowly each year and will most likely continue at this pace.

Oceania: Feed production was up over 2%.

Region Total Feed Tonnage Growth from 2021

Asia-Pacific	153,53	0,08%
Latin America	67,56	1,27%
North America	60,13	3,32%
Europe	54,17	-1,40%
Africa	13,13	-5,95%
Middle East	11,40	38,75%
Oceania	4,04	2,10%
Усього	363,96	1,27%

2022 Feed Tonnage by Region



*All numbers are in million metric tons

Region	2021 broiler feed tonnage (MMT*)	2022 broiler feed tonnage (MMT)	Growth (MMT)	Growth %
Africa	13.956	13.126	(0.830)	-5.95%
Asia-Pacific	153.404	153.532	0.128	0.08%
Europe	54.938	54.169	(0.769)	-1.40%
Latin America	66.717	67.561	0.845	1.27%
Middle East	8.217	11.401	3.184	38.75%
North America	58.200	60.132	1.932	3.32%
Oceania	3.956	4.039	0.083	2.10%
Grand Total	359.387	363.960	4.573	1.27%

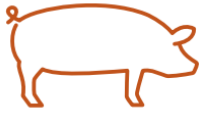
*Million metric tons

According to the materials of the Alltech company, 2022



3.

PIGS



Globally, feed production was down in 2022 by almost 3%. ASF and high feed prices depressed pig production in many countries. However, in Vietnam, China, South Africa, Brazil and Mexico, better pork prices and other market conditions led to growth in the sector.

Africa: Production was down slightly, due in part to African swine fever (ASF) and high feed costs. Better pork prices in South Africa led to an increase of 0.175 MMT of pig feed production.

Asia-Pacific: Vietnam feed production increased by 3.36 MMT in 2022. Production has recovered to nearly the same level it was before the region was challenged by ASF. As pork prices increase, more farms are investing in pigs. Thailand's pig feed production was reduced by 1.01 MMT because of ASF. Low pork prices led to a decrease of 5.5 MMT in pig feed production in China.

Europe: ASF affected the Eastern European countries and Ireland, where feed tonnage was down 2.16%. Germany reported an 8% reduction due to a ban on exports to Asia. High production costs and low pork prices affected pig producers, but prices are showing signs of recovery.

Latin America: The pig industry expanded in Latin America, thanks to increased demand, decreases in food costs, favorable exchange rates and opportunities to export to Asia. Brazil's tonnage grew by 4%.

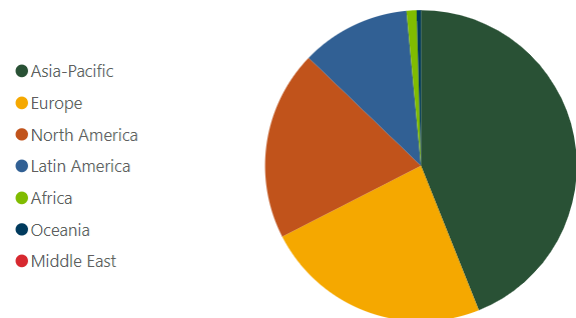
Middle East: Production remained steady in Israel, the only country that produces pig feed.

North America: Feed production decreased by nearly 1% because of a reduction in pork supply, outbreaks of porcine reproductive and respiratory syndrome (PRRS), high feed and trucking costs, disruptions in trade, labor shortages and input cost volatility aggravated by the invasion of Ukraine.

Oceania: Production remained steady in Australia and increased over 8% in New Zealand.

Region	Total Feed Tonnage	Growth from 2021
Asia-Pacific	140,38	-2,20%
Europe	75,12	-8,25%
North America	62,98	-0,97%
Latin America	36,17	2,02%
Africa	3,32	-0,05%
Oceania	1,41	0,93%
Middle East	0,01	0,50%
Усього	319,38	-2,98%

2022 Feed Tonnage by Region



*All numbers are in million metric tons

4.

DAIRY



In most countries, there was a decline in commercial feed production for dairy, mainly due to the high cost of feed combined with low milk prices, which caused farmers to reduce their numbers of cows and/or rely more on non-commercial feed sources. Some exceptions included Ireland, where drought caused farmers to rely more on commercial feeds, and New Zealand, where milk prices were higher.

Africa: Dairy feed tonnage dropped or remained flat in most of the feed-producing countries.

Asia-Pacific: Vietnam reported a 16% growth in feed production. Smaller increases were reported in India, China, Japan, Thailand, Malaysia, Taiwan and Mongolia. Nepal, Pakistan, Sri Lanka and Bangladesh reported decreases in dairy feed tonnage because of reduced milk consumption and reductions in breeder stock.

Europe: Many countries saw reductions in dairy feed tonnage, including the Netherlands, Kazakhstan, Turkey, Spain, Poland, Sweden, Belgium, Ukraine and Bulgaria, among others. There was a 6% increase in feed production in Ireland, where summer droughts necessitated the need for supplementary feed. Increases were also reported in Portugal, the Czech Republic, Austria, Lithuania, Hungary and others.

Latin America: Peru reported a double-digit feed production decrease in 2022 due to a reduced commercial dairy population in the region. Brazil's dairy feed production dropped in 2022 because of unfavorable weather that resulted in poorer pasture conditions, as well as lower consumer demand, economic challenges, low consumer disposable income and elevated milk retail prices.

Middle East: Dairy feed production increased in nearly every country.

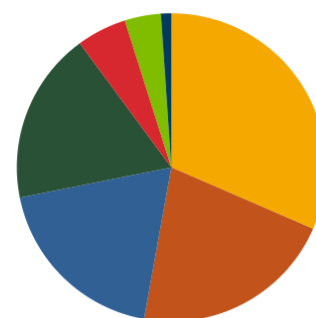
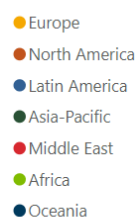
North America: Feed tonnage dropped slightly in 2022, with the U.S. and Canada reporting a 0.82% and 0.70% decline in dairy feed production, respectively. A reduction in dairy cows slowed feed production in the U.S., where high building costs and feed costs have limited expansion.

Oceania: There was a 23.7% (0.028 MMT) increase in New Zealand's dairy feed tonnage. High milk prices encouraged farmers to feed more. Australia's dairy feed production was down over 7%.

Region Total Feed Tonnage Growth from 2021

Region	Total Feed Tonnage	Growth from 2021
Europe	42,20	-2,80%
North America	28,50	-0,70%
Latin America	25,46	-1,08%
Asia-Pacific	24,15	0,07%
Middle East	6,99	7,11%
Africa	5,07	-9,12%
Oceania	1,45	-4,74%
Усього	133,82	-1,32%

*All numbers are in million metric tons

2022 Feed Tonnage by Region

5.

BEEF

The trend toward a reduction in beef feed production appears to have slowed, with feed production down only 0.34% in 2022. The downward trend continued in Europe, but increases were seen in almost all other regions. In Australia, the reduction in feed tonnage was a result of plentiful grass and not a reflection of any changes in the demand for beef. Growth in 2023 is expected in China, Brazil and Australia, according to Rabobank, while decreases are anticipated in the U.S., Canada and in countries throughout Europe.

Africa: Beef feed production grew nearly 4% in 2022, with the biggest increases happening in Namibia and Mozambique.

Asia-Pacific: Feed millers in Bangladesh are focusing more on cattle feed, as the market for concentrate feed is growing significantly. As a result, that country reported a 56% increase in its beef feed production, from 0.261 MMT to 0.408 MMT. South Korea reported a 3% increase in feed production, from 4.06 MMT to nearly 4.2 MMT. China and Japan also reported small increases.

Europe: Though several countries reported significant increases, overall feed production was down over 10%. Bulgaria reported a small shift from dairy to beef production because of low milk prices. In many cases, drought and higher beef prices incentivized feed supplementation.

Latin America: The high prices of bovine animals and meat in 2022 provided a steady incentive for cattle growers to expand production.

Middle East: There was very little growth in beef feed production in 2022.

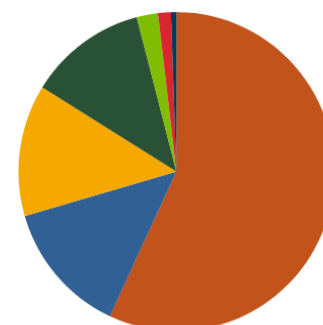
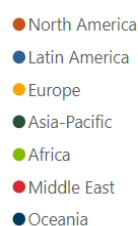
North America: The region is in its fourth straight year of declining herd population caused by drought and economic issues, but it has not affected feed production. Experts anticipate 2023 to be the tipping point, with a predicted decline of 2-3%.

Oceania: Production dropped in both Australia and New Zealand. The region reported a 12% decline.

Region Total Feed Tonnage Growth from 2021

Region	Total Feed Tonnage	Growth from 2021
North America	67,20	0,64%
Latin America	16,02	2,39%
Europe	15,77	-10,13%
Asia-Pacific	14,28	3,40%
Africa	2,57	3,84%
Middle East	1,56	6,89%
Oceania	0,65	-12,16%
Усього	118,04	-0,34%

*All numbers are in million metric tons

2022 Feed Tonnage by Region

According to the materials of the Alltech company, 2022



6.

AQUACULTURE



The aquaculture sector experienced a total global feed production growth of 2.7%. The top 5 aquaculture feed countries are China, Vietnam, India, Norway and Indonesia. Significant increases were reported in China, Brazil, Ecuador, the Philippines and the U.S. The aquaculture sector was one of a few sectors up in Europe, where large decreases in feed production were reported across several sectors.

Africa: Aquaculture feed production was down 2.38% in 2022, though increases were reported in South Africa, Zimbabwe, Zambia, Ghana and Seychelles.

Asia-Pacific: With the recovery of China's economy and improvements in living standards in recent years, the demand for aquatic products has been increasing. The scale of the region's aquaculture industry expanded in 2022. There also was feed production growth in the Philippines, Bangladesh, South Korea, Malaysia and others.

Europe: Aquaculture feed tonnage grew by 1.78%

Latin America: Ecuador has become the No. 1 shrimp producer in the world, and 2022 was a record year for feed production. It had a 17% increase in feed tonnage.

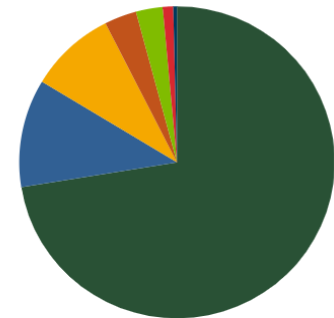
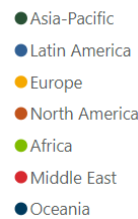
Middle East: Slight growth was reported in the Middle East, where all countries had feed tonnage increases or stayed at the same level as 2021.

North America: Aquaculture feed tonnage was up 2% (0.02 MMT) due to increases in fish prices, favorable weather conditions and the lifting of size restrictions.

Oceania: Australia's feed tonnage was up over 5% in 2022.

Region	Total Feed Tonnage	Growth from 2021
Asia-Pacific	38,34	2,65%
Latin America	5,92	4,79%
Europe	4,69	1,78%
North America	1,75	1,16%
Africa	1,45	-2,38%
Middle East	0,57	13,14%
Oceania	0,20	5,26%
Усього	52,91	2,72%

2022 Feed Tonnage by Region



*All numbers are in million metric tons

7.

PETS



Of all of the species sectors measured in the Agri-Food Outlook survey, the pet food sector — which increased by 7.25% — had the most significant growth. It was up even in Europe, the region that dipped most in 2022 feed production.

Africa: Feed tonnage dropped off by nearly 25% in Africa. The only increase was reported in Kenya, where many feed mills are now producing pet products.

Asia-Pacific: The Philippines reported a significant 34% increase (0.017 MMT) in pet food production. Pet ownership is growing and COVID-19 lockdowns highlighted the need for locally produced pet food, spurring local food manufacturers into action. Top food companies in the Philippines also entered the pet food business. The pet food market in South Korea is also growing quickly.

Europe: Feed tonnage was up 1.65%, thanks in large part to growth in France's pet feed production, which grew nearly 75%, from 1.204 MMT to 2.105 MMT. The second-largest pet food producer was the UK, but its production did not increase over 2021's estimates. Russia reported a 9% increase, from 1.236 MMT to 1.347 MMT.

Latin America: In Chile, there was large increase in pet food tonnage along with an increase in demand for food and treats for pets.

Middle East: Pet feed tonnage was up 17.25% in Israel, from 0.090 MMT to 0.106 MMT.

North America: Production increased by 5.66%. In the U.S., pet food prices have increased, which contributed to increased revenue value. However, there has been about a 35% increase in freeze-dried and dehydrated foods which offset the total tonnage. There also has been an uptick in human grade, frozen and fresh meals for pets.

Oceania: Feed tonnage increased in Australia by 11.11% and stayed flat in New Zealand.



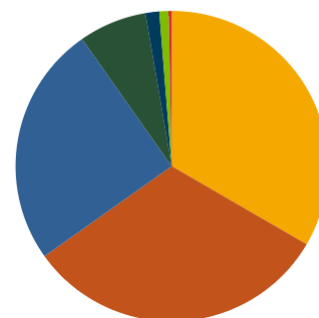
Region Total Feed Tonnage Growth from 2021

Europe	11,78	1,65%
North America	11,20	5,66%
Latin America	8,86	19,22%
Asia-Pacific	2,48	9,33%
Oceania	0,50	11,06%
Africa	0,34	-24,57%
Middle East	0,11	17,25%
Усього	35,27	7,25%

*All numbers are in million metric tons

2022 Feed Tonnage by Region

- Europe
- North America
- Latin America
- Asia-Pacific
- Oceania
- Africa
- Middle East



8.

EQUINE



The equine sector increased by 0.83%, growing in all regions except Latin America. It displayed the highest growth in Asia-Pacific and Oceania. Equine feed is a growing market; significant increases in production and sales are expected in the next few years.

Africa: Equine feed tonnage grew slightly in South Africa, from 0.075 MMT to 0.077 MMT (2.67%).

Asia-Pacific: The region reported an 8.5% increase, led by significant production growth in India, Indonesia, Mongolia and Sri Lanka.

Europe: Many countries reported increased or stable equine feed tonnage. Large increases were reported in Hungary, the Czech Republic and Portugal. Reductions were reported in Spain, Ukraine, Kazakhstan, Ireland and others.

Latin America: Feed tonnage decreased over 4.5% in 2022. Production in Argentina, the Dominican Republic, Costa Rica and Brazil was down; large increases were reported in Bolivia, Paraguay, Ecuador and Guatemala.

Middle East: There was a slight increase in feed tonnage, thanks to small growth in Saudi Arabia.

North America: Canada feed tonnage remained flat and production in the U.S. grew slightly, leading to a 0.58% increase overall.

Oceania: Australia's feed tonnage was up, but New Zealand's was down, leading to a 7% increase in the region.

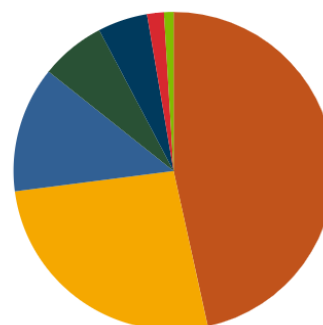
Region Total Feed Tonnage Growth from 2021

North America	3,80	0,58%
Europe	2,15	1,09%
Latin America	1,04	-4,54%
Asia-Pacific	0,54	8,51%
Oceania	0,41	7,05%
Middle East	0,14	1,47%
Africa	0,08	1,25%
Усього	8,16	0,83%

*All numbers are in million metric tons

2022 Feed Tonnage by Region

- North America
- Europe
- Latin America
- Asia-Pacific
- Oceania
- Middle East
- Africa



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Cite as Vancouver Citation Style

Global feed production remains steady in 2022. Grain Products and Mixed Fodder's, 2022; 22 (2, 86): 9-16.

Cite as State Standard of Ukraine 8302:2015

Global feed production remains steady in 2022// Grain Products and Mixed Fodder's. 2022. Vol. 22, Issue 2 (86). P. 9-16.

