



Kipster's Journey toward US Expansion

Kipster made waves in Europe when it introduced its circular, carbon neutral, animal friendly egg production model in the Netherlands in 2017. The first-of-its-kind farm, established in collaboration with NGOs and lead experts from Wageningen University, was designed to cater to the chickens' natural tendencies and lifecycle. Since launching, Kipster has remained committed to full transparency, opening its farm to visitors, and sharing freely about its model and lessons learned, seeking to drive greater sustainability across animal protein production.

Traditional egg production uses conventional animal feed ingredients such as corn and soy and raises hens in confined spaces. There has been a growing cage-free movement in recent years with over 200 companies making commitments to cage-free production in the US alone. The US flock of cage-free layers is approximately 36% of total layers as of the end of 2020, up from around 3 percent in 2014.¹ In the majority of egg production, male chicks are killed when first born due to their low economic value, because the breed of chicken raised for egg production is not as efficient as broiler chickens raised for meat. This leads to the slaughter of some 300 million male chicks in the US per year on average.

Kipster's circular model upends this conventional egg production system, transforming everything from feed to

the chickens' environment to raising roosters for meat. The pillars of Kipster's model center around using surplus food for feed, carbon neutrality, and animal welfare. In 2021, Kipster formed a collaboration with The Kroger Co. and MPS Egg Farms to expand production into the US, creating significant market potential and growth opportunities, as well as unique challenges due to a distinct market and differing regulations and operating norms.

Kipster's core beliefs for livestock production

- Farm animals should contribute to a sustainable and healthy food system and environment
- Humans must respect the emotions and instincts of farm animals
- If you can grow crops for human food, don't grow crops for animal feed



Circular Feed

Nearly 40 percent of food produced globally is lost or wasted, not only squandering all the resources it took to grow the food, but also releasing methane when landfilled.² In traditional large-scale egg production, chickens are fed a mix of grains such as corn, soy, and other ingredients to enable a balanced diet for optimal nutrition and growth at the lowest cost. While commercial breeds are genetically optimized for high production on grain-based diets, chickens are naturally omnivores and have evolved to eat a range of different foods. Prior to industrialized egg and poultry production, as well as scaled animal feed production, surplus food was a common ingredient in chicken feed.

Kipster is building on this history of feeding surplus food to chickens; indeed, it is a critical component to its model to achieve circularity and carbon neutrality. It works with a feed company with which Kipster aligns on the ingredient mix according to its sourcing values, including surplus food from bakeries in the Netherlands and a pasta company in the US. Surplus food and farm residues make up around 90-95 percent of the feed blend in the Netherlands (the proportion is lower in the US but will increase over time); the remaining 5-10 percent includes conventional feed and supplements to ensure that the chickens' diets are nutritionally balanced and that they receive any required nutrients that are not part of the surplus food mix.

In the US, the initial mix fed to chickens includes food manufacturing by-products, farm residues, by-products from corn processing, and slaughterhouse waste such as bone and meat meal. Kipster's US feed mix duplicates the nutrient profile(s) of those in the Netherlands, even with differing ingredients. Given a longer history of successful production in the Netherlands, direct comparisons of the diets across locations once the US operations are established via a lifecycle assessment (LCA) would provide useful research, given that they use the same production model in the US and Europe but different suitable and available raw ingredients. Production environments are also different, and an LCA could offer further insights into geographical differences for future expansion.

Food waste versus surplus food

Food waste is food that is produced, using resources throughout the farming and production processes, but gets disposed of into landfills, releasing methane and contributing to climate change.

However, the idea that this food truly is "waste" does not quite capture reality. Wasting food is a choice, but the term "food waste" implies that there is no value to the food not eaten by humans. In reality, much of it can be upcycled into secondary uses like animal feed, soil amendments, and energy production. The ultimate goal is to efficiently match human food production to food consumption, minimizing surplus and the ecological footprint of agriculture.

This analysis of Kipster demonstrates that *surplus food* or food resources and inedible parts that are currently landfilled or may go to lower value uses, such as composting, does indeed have value and can help to fuel profitable businesses.



Circular manure practices

Manure treatment represents a critical area for any products derived from livestock, as manure influences GHG emissions, air quality, water quality, and more. Manure is also a valuable by-product of egg production.

For Kipster, temperature and climate control in the hen house (e.g., drafts of cold air) impact the manure, as does the feed mix. Through feed and water, as well as climate conditions, the 'wetness' of the manure can be manipulated, which is critical as overly wet manure releases more ammonia and can be more difficult to process and manage, leading to higher GHG emissions.

Kipster actively measures ammonia levels and dries the manure on the manure belt in the aviary system, running the manure belt at least once a day. The belt dumps it at the back of the farm (outside of where the chickens reside) where it is stored. MPS Egg Farms, Kipster's US farm partner, will take the manure to a nearby manure processing facility that pelletizes it for sale as a fertilizer, reducing emissions and creating a value-add product.



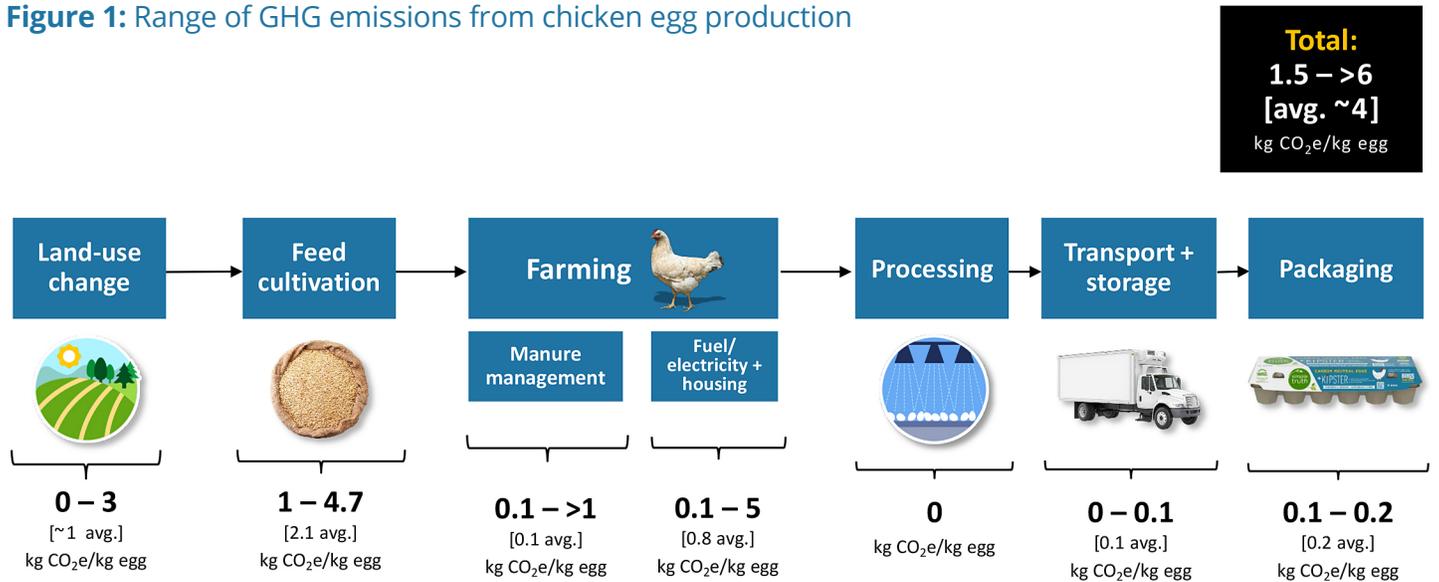
One of Kipster's core beliefs is that fertile agricultural soils should be used to grow crops for humans. Marginal lands can be grazed, and surplus food can be fed to livestock. The use of surplus food and by-products for feed fits into this philosophy of using land to feed people rather than animals and reducing systemic waste by feeding it to chickens. As a result, Kipster feed uses around 42 percent less land than conventional feed, greatly reducing greenhouse gas emissions.

While the general idea of feeding surplus food to animals is not new, Kipster faces the challenge of sourcing reliable and consistent surplus streams of the quality and scale for its operations without creating additional food waste. To keep costs down, the company needs to have a reliable mix of appropriate kinds of surplus for the chickens at the right volume, as well as to understand the nutritional characteristics and digestibility of the ingredients.

Another challenge inherent in feeding surplus food to chickens is that, depending on the type of surplus, some ingredients (particularly those from processed bakery surplus) contain higher concentrations of salt than required, as well as simple sugars and carbohydrates that can result in rapid passage through the digestive tract, leading to reduced nutrient uptake. Due to this challenge, Kipster supplements diets to improve nutrient balance and continually monitors the diets' impact on chickens to make changes and improvements in its mix as appropriate.

Because most egg production at scale is based on conventional rations, there is scant science-based research on the kinds of circular feed practices Kipster is pursuing. As a result, there is insufficient information available on poultry breed responses and understanding of optimal feed mixes utilizing human food, slaughter, or other waste stream ingredients. Limited research exists on circular egg production and the environmental impact of upcycled feed ingredients. Kipster hopes that by increasing transparency, more research can be produced to further understanding of circular systems for eggs and other types of livestock products.

Figure 1: Range of GHG emissions from chicken egg production



Carbon Neutrality

As compared to the range of emissions for egg production noted in the graphic above, Kipster's average emissions per egg were around 2.1 kg CO₂e per kg egg in the Netherlands in 2021. Kipster's US figures are anticipated to start at a similar level. While the results of life-cycle assessments conducted in different ways is inherently incomparable, a footprint of 2-3 kg CO₂e/kg egg at farm gate is a reasonable estimate for efficient US or European production. Kipster's 2.1 kg CO₂e/kg egg footprint suggests that its practices are producing relatively low-GHG eggs. Because current accounting methods do not typically capture circular practices, it is also likely that these types of assessments underestimate the benefits of Kipster's model. Specifically, such assessments do not include rearing of the roosters or displacement of broiler meat for rooster meat. Nor do they consider that Kipster attempts to source soy used in the Netherlands as soybean meal from a human consumption waste stream versus soybean meal as a primary product as much as is possible.

Like all agricultural products, to meet climate targets, feed ingredients' carbon footprints will need to decline by about 80% from current levels by 2050.³ Since feed is the primary driver of emissions within egg production,

this is a key area for Kipster. In the Netherlands, Kipster's circular feed has a carbon footprint around half that of traditional feed, contributing to Kipster's goal of carbon neutrality.⁴ Its facilities also have solar panels covering the roof, producing renewable energy for its facilities; it sells any excess back into the grid.

Remaining emissions are offset through carbon credits with Climate Impact Partners, although WWF cautions companies on claiming carbon neutrality through offsets, as it can signal that a company's work is done even though a company or product's entire footprint hasn't been eliminated.⁵ WWF recommends that companies work to lower their emissions over time in line with science-based targets, and only use offsets to go above and beyond progress towards those targets. Kipster is continuing to explore additional ways to bring down its energy footprint as well as the carbon footprint of its feed by assessing each individual ingredient to determine if emissions can be lowered or if alternatives should be pursued.

Additionally, using surplus food that would otherwise go to landfills further contributes to carbon neutrality. When surplus food is diverted from landfills instead of used

in a value-added capacity as Kipster is doing, methane emissions are avoided. Although Kipster cannot assert whether the totality of surplus food it is using would be landfilled or go to another, lower value use, by using the surplus food as feed, it is going to a higher value use and likely avoiding some methane emissions. This could represent an area of further study to gain better understanding of the full environmental impact of circular feed practices.

Animal Welfare

The Kipster facilities are designed around the instincts and needs of chickens. The barns include a wooded environment with daylight, fresh air, and free-range foraging space in both the indoor and outdoor gardens. In the Netherlands, Kipster worked with Wageningen University to design its facilities around chickens' natural tendencies, and it has carried this design into its US operations. Kipster eggs are also certified cage-free by Certified Humane after the certification program allowed for use of animal by-products such as bone and meat meal as a protein source in Kipster's feed mix. Animal products as part of feed are typically not permitted in the certification, but Kipster was able to get an exception because it is trying to reduce its dependence on land for feed through the use of surplus food.

Advancing human and animal welfare

A challenge in conventional egg and broiler production is air quality impact on surrounding communities.

Kipster is addressing this by using a water-based air filter system, which includes an air washer at the back of the barn. The barn's air is pushed towards the back of the barn where it goes through an indoor rain system which filters out dust, ammonia, and particulate matter. The clean air is then pushed back into the farm system. Heat from the system is then pushed back into the farm, reducing energy needs from heating.

Another differentiator from conventional systems is that Kipster does not debeak the hens, a practice commonly used to prevent hens raised in close proximity from harming one another or engaging in cannibalism. To prevent pecking, Kipster provides enrichments such as spreading feed on the indoor garden's floors for chickens to forage, alfalfa hay bales and pecking blocks, and structures to climb. Furthermore, managing the amount of fiber in feed as well as light quantity and intensity





helps mitigate pecking behavior. Although currently the outdoor garden is closed due to prevalence of bird flu, when it is open, it provides another distraction to aid in preventing pecking behavior.

In conventional egg production, the male chicks are typically killed the day they are born, as there is not sufficient economic value in raising them. This can be a challenge to both farmers and animal welfare advocates, as it leads to 300 million male chicks being killed each year in the US alone, which are likely either sent to a landfill or used in pet food. There is technology in development to enable detection of sex prior to birth of the chicks, which would allow the male eggs to be sold as eggs rather than hatched and killed, but that technology is not yet fully developed.

In contrast to this traditional practice, Kipster raises the roosters and spent hens for meat. This both creates an additional market, as well as its own challenges. Chickens raised for egg production do not grow at the same rate as broiler chickens raised for meat, which leads to tradeoffs between animal welfare and environmental impact, as the roosters take longer to reach slaughter weight. That also leads to higher greenhouse gas emissions, as more feed and higher energy usage is required to produce less meat per animal. Kipster works to counteract the

tradeoff of higher GHGs through its efforts in circular feed practices and reducing its overall GHG footprint.

Beyond GHG emissions, raising roosters for meat presents additional obstacles, as the size and flavor profile of the meat is considerably different from broilers. Finding slaughterhouses in the US that can process roosters and spent hens at volume within a reasonable proximity to the Kipster operations in Indiana has presented an issue; they are also more expensive than traditional slaughterhouses. Additionally, finding a market for the rooster meat, which is mixed with the spent-hen meat to create volume and lower the final price, in a country where it is not traditionally consumed is an ongoing challenge. Kipster is approaching it in a variety of ways, including working with the R&D team of a US-based meat company to develop a Kipster-branded product, with Italian meatballs currently under consideration, for sale at Kroger retail outlets.



US Expansion

The Kipster US facility is located in Indiana where it is operated by US-based farmer partner, MPS Egg Farms. MPS is a long-standing supplier to Kroger, providing both conventional and cage-free eggs. Kipster US expansion will start with four barns with 24,000 hens each. Darling Ingredients is supplying pasta surplus as part of the feed formulation and Kipster and MPS are working with Kalmbach Feeds in Ohio to supplement food and slaughter waste products with traditional feed. At its feed mill, Kalmbach mixes all the ingredients into one complete feed for the chickens and delivers it to the Kipster barns.

In the Netherlands, Kipster works closely with Nijssen, its feed supplier, to reduce the GHG impact of its feed mix. The US feed industry is not as far along as Europe in assessing the sustainability of individual feed ingredients, but Kipster will begin to work with its feed suppliers to assess the emissions of ingredients in the feed mix. This will enable a more robust analysis of total GHG emissions in the feed, as well as provide the data needed to make decisions to reduce the feed's GHG emissions over time. In the Netherlands, Kipster has a carbon budget for its feed as well as for overall operations that it measures against quarterly. It hopes to implement a similar system in the US over time as the emissions are assessed relative to estimated emissions.

Kipster eggs are a mid-market product, costing more than cage-free eggs but less than some organic and free-range brands. The eggs are branded under Kroger's private label brand as Simple Truth + Kipster eggs and are currently retailing for \$5.99/dozen at select Kroger stores in Ohio and Michigan, at Ralphs stores in California, and at King Soopers in Colorado. Kipster has a long term collaboration with Kroger and MPS Egg Farms for Kipster eggs to be sold at Kroger Co-owned stores, but it is also interested in expanding beyond retail in the medium to long-term. Additionally, some eggs will not meet specifications required for retail eggs but that could be cracked and made into processed food products. Kipster is looking for markets for these eggs.

To drive uptake in the US, consumer education around sustainable egg production will be a critical undertaking for Kipster as it seeks to expand. As at its Netherlands farm, the Kipster farm has a visitor center which opened on March 1, 2023, where visitors can see the chickens and learn about egg production. There is also a [24/7 livestream camera](#) online for people to view the chickens, and frequent social media posts. Kroger also has a page on its website as well to educate consumers about Kipster production methods.⁶



Kipster Cam 7 NL



Kipster Cam 6 NL



Kipster Cam 4 NL



Kipster Cam 3 NL



Kipster Cam 2 NL



Kipster Cam 1 NL



Kipster Cam 2 USA



Kipster Cam 1 USA



Kipster Cam 5 USA



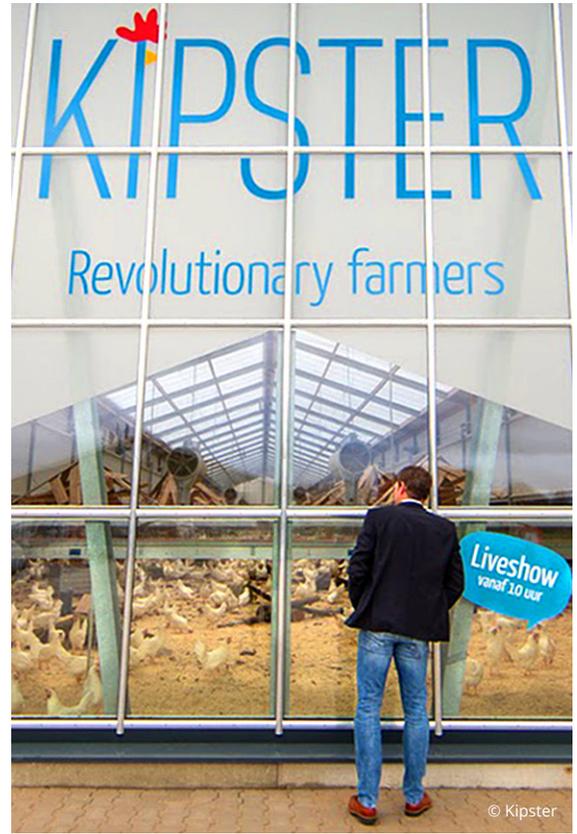
Kipster Cam 4 USA



Kipster Cam 3 USA



Kipster Cam 5 NL



Conclusion

Despite initial skepticism over the model, Kipster has demonstrated that it can accomplish lower environmental impact and higher animal welfare production while also maintaining profitability and production standards in the Netherlands. Sales have been increasing at LIDL, Kipster's retail partner in the Netherlands, which is leading Kipster to add two more barns to meet demand. Lessons learned from LIDL, where rooster and spent hen meat is also sold (including with new products recently introduced), may provide valuable insight to drive greater success in the US.

With the US market of over 300 million layers and sales of around 7 million tons of eggs per year, there is a lot of room for growth for Kipster as it seeks to replicate its model's success and profitability in a new market. Kipster's processes and technologies can also be adapted in different countries using locally appropriate surplus food. Indeed, it is expanding in Belgium, France, and the United Kingdom, with 8-10 new barns anticipated across these countries in the next few years. Further partnerships are being explored outside of the US and Europe as well.

Additionally, many companies have cage-free commitments, Science Based Targets, and other environmental goals. By partnering with Kipster in their supply chain, as well as considering other circular models, companies can further their progress toward achieving these goals. It's time to adopt and grow models that consider the whole lifecycle of products to address mounting environmental challenges, and Kipster is one example of how such a model can also be profitable and scale in different geographies.

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Footnotes

- 1 <https://unitedegg.com/facts-stats/>
- 2 <https://www.worldwildlife.org/publications/driven-to-waste-the-global-impact-of-food-loss-and-waste-on-farms#:~:text=This%20publication%20relates%20to%3A&text=Driven%20to%20Waste%3A%20Global%20Food,billion%20tonnes%20wasted%20each%20year>
- 3 https://wwfint.awsassets.panda.org/downloads/dcf_critical_for_1_5_pathway__summary_and_techincal_methods.pdf
- 4 The comparison with traditional feed included land use change emissions and a comparison of Kipster feed with a layer feed mix of about 59% grains, 30% by-products from crop processing, 10% additives, and 1% food manufacturing by-products.
- 5 https://files.worldwildlife.org/wwfcmsprod/files/Publication/file/773q5lvbf0_WWF_position_and_guidance_on_corporate_use_of_voluntary_carbon_credits_EXTERNAL_VERSION_11_October_2019_v1.2.pdf?_ga=2.38798947.1360378713.1666634505-162293021.1593456681
- 6 <https://www.kroger.com/b/simpletruth/simple-truth-kipster>