



WP6. Task 6.3.3 Animal Feed

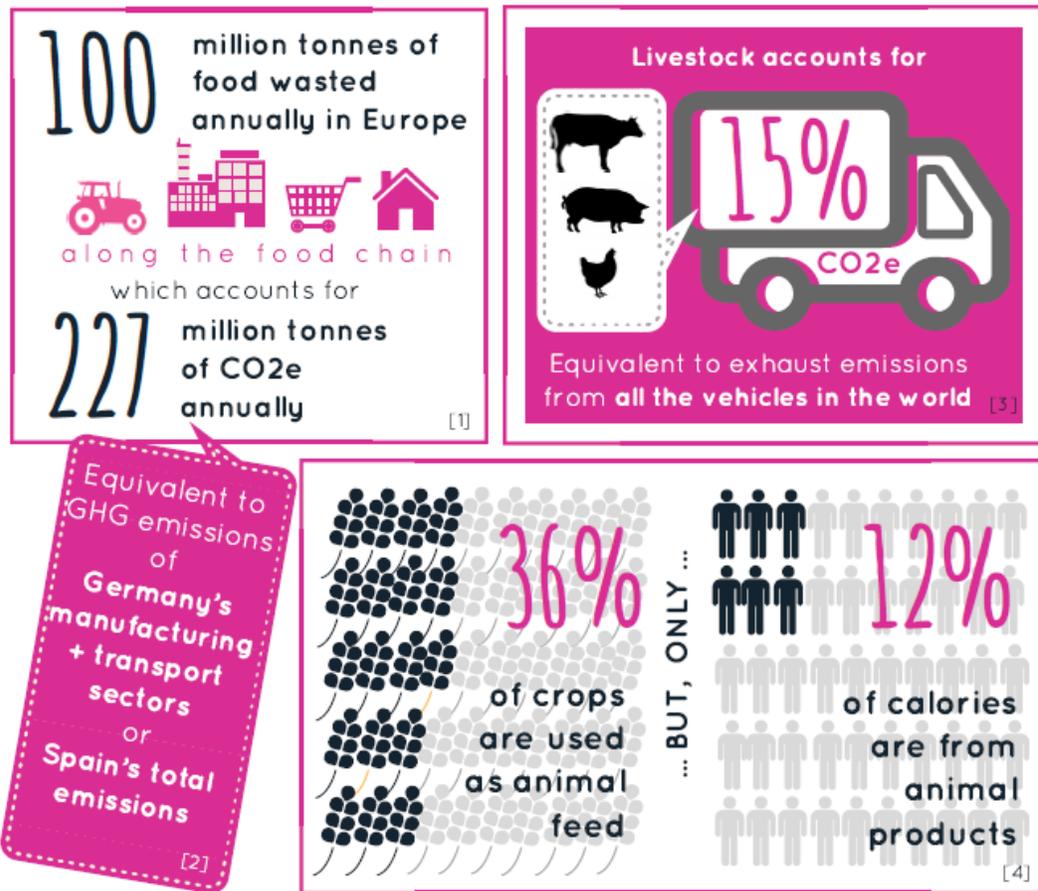
Opportunities for recycling surplus food that is no longer fit for human consumption

Karen Luyckx
Feedback



FOOD SOLUTIONS DINNER THE CHALLENGE

We need a global food system that meets the nutritional needs of all humans equally, today and in the future, but does not contribute to runaway climate change, pollution or exhaustion of finite resources.



A drastic reduction in food and agricultural waste, and a radical change in dietary patterns are fundamental to a sustainable global food system.

CREATING A SUSTAINABLE GLOBAL FOOD SYSTEM

Sustainable intensification - where optimal yields are achieved with minimal resource use and environmental impact - will be key. However, intensification alone will not be enough.

Cutting food and agricultural waste by half has been calculated to reduce the area of global cropland by around 14% and GHG emissions by 22-28% compared to a scenario achieving optimal yields through sustainable intensification alone.

Adding healthy diets - with a significant reduction in energy-rich foods such as sugars and saturated fats, including livestock products - to a scenario of reduced waste and optimal yields, would lead to a further reduction in the area necessary for cropping by an estimated 5%, pasture by 25% and the total GHG emissions by 45% [5]

References:

- [1] <https://www.eu-fusions.org/index.php/about-food-waste>
- [2] [http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Greenhouse_gas_emissions_by_economic_activity_2014_\(thousand_tonnes_of_CO2_equivalents\)_YB17.png](http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Greenhouse_gas_emissions_by_economic_activity_2014_(thousand_tonnes_of_CO2_equivalents)_YB17.png) Germany manufacturing: 163,322 kT + transport 85,364 kT = 248,686kT. Spain total: 247,701
- [3] Wellesley, L. et al "Changing Climate, Changing Diets" Chatham House (2015) <https://www.chathamhouse.org/publication/changing-climate-changing-diets>
- [4] Cassidy, E.S., West, P.C., Gerber, J.S. and Foley, J.A., 2013. Redefining agricultural yields: from tonnes to people nourished per hectare. Environmental Research Letters, 8(3), p.034015
- [5] Bajželj, Bojana, et al. "Importance of food-demand management for climate mitigation." Nature Climate Change 4.10 (2014): 924-929.

FEEDING PIGS ON FOOD WASTE COULD ...

REDUCE LAND FOR
EU PORK PRODUCTION

BY **1.8 MILLION**
HECTARES

EQUIVALENT TO
LAKE CONSTANCE
x30

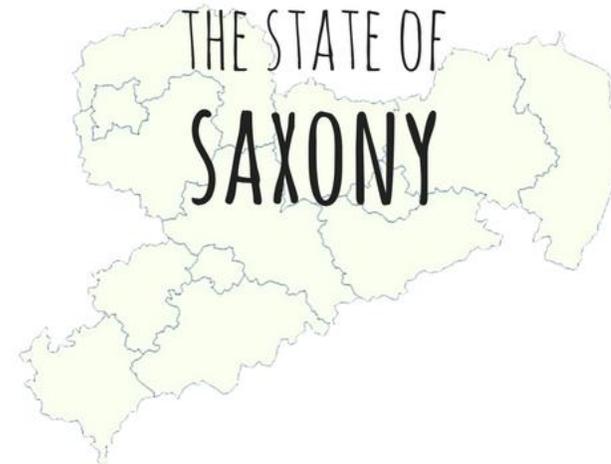


EQUIVALENT TO
THE BLACK FOREST



EQUIVALENT TO

THE STATE OF
SAXONY

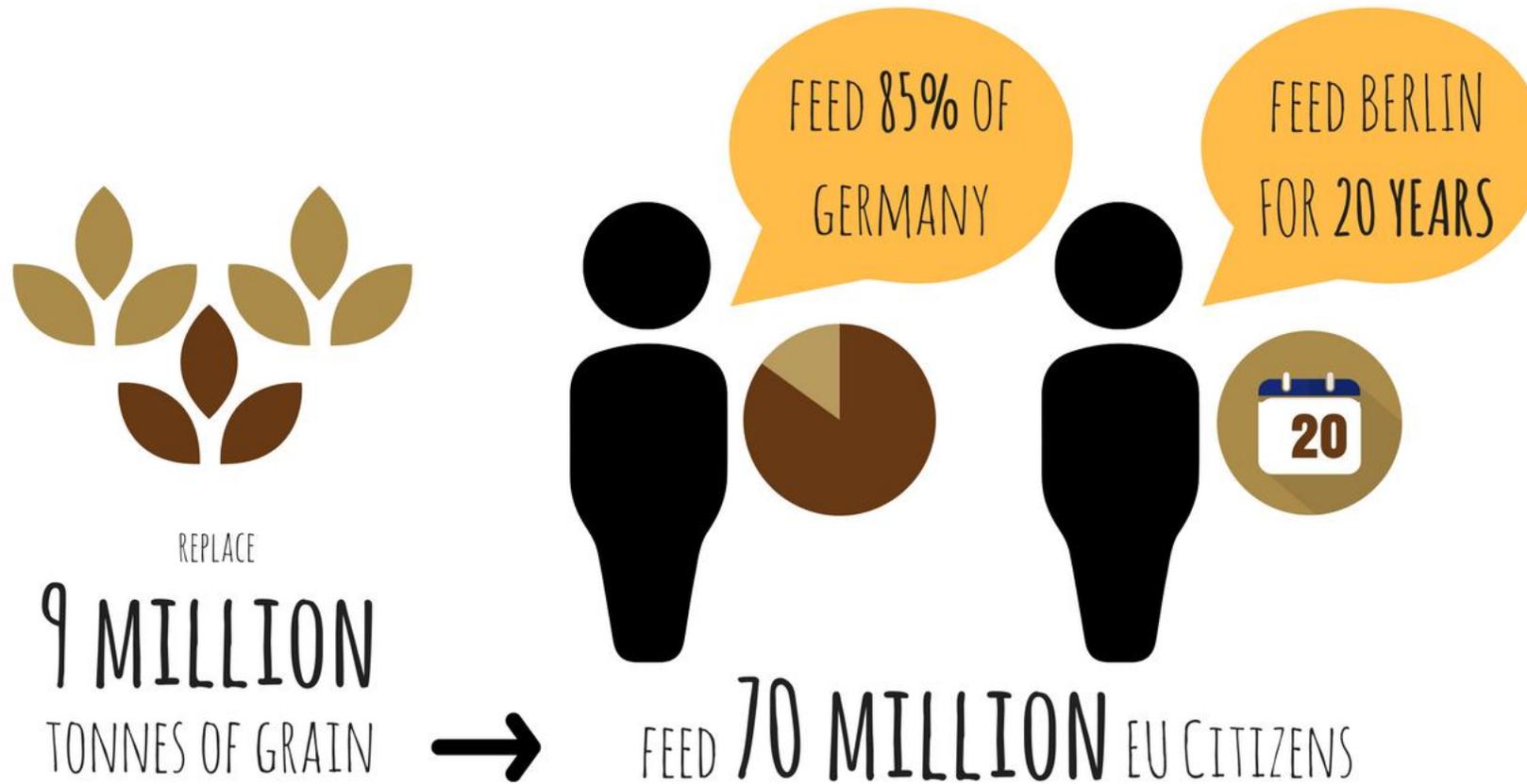


If feeding of left-over food were legalised following the Japanese and South-Korean models, and **half the current European food waste** was recycled to animal feed the land requirement of EU pork production has the potential to shrink by **1.8 million ha**

**FEED
BACK**

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FEEDING PIGS ON FOOD WASTE COULD ...



Food leftovers could replace **8.8 million tonnes** of human-edible grains currently fed to pigs – equivalent to the annual cereal consumption of **70.3 million EU citizens**

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FEEDING PIGS ON FOOD WASTE COULD ...



REDUCE DEMAND FOR

268,000 HECTARES
OF SOYBEAN



REDUCE SOYBEAN EXPANSION TO SAVE

40 MILLION
AMAZONIAN TREES

Feeding pigs on food waste could reduce pressure on sensitive ecosystems by reducing the demand for up to **268k hectares** of soybean. Nearly half of Europe's soybeans come from Brazil and reducing the expansion of soybean production there could save over **40 million trees**

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PIGS ARE OMNIVORES AND OPPORTUNISTS



THE NATURAL DIET OF PIGS INCLUDES

PLANTS & ANIMALS
IN THE WILD



THE DIET OF DOMESTIC PIGS IN THE EU INCLUDES

PROCESSED FEED
ON OUR FARMS

Pigs are omnivores so their diets naturally contain plants & animals. In the wild, pigs are known to eat carrion as well as the young and weak of many species, including their own. EU regulated pigs do not eat meat, so receive protein from soya & fish meal in processed feed.

**FEED
BACK**

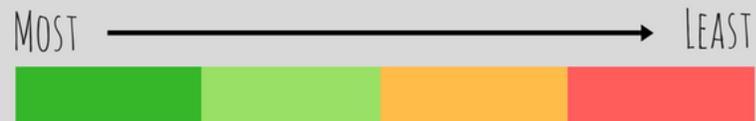
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ENVIRONMENTAL IMPACT OF FOOD WASTE RECYCLING

	Pig feed (wet)	Pig feed (dry)	Biogas	Compost
Damage to the ozone layer	Green	Light Green	Orange	Red
Carcinogens	Green	Light Green	Orange	Red
Non-carcinogenic toxins eg heavy metals	Green	Light Green	Orange	Orange
Ionizing radiation	Green	Light Green	Red	Orange
Photochemical oxidant formation	Green	Light Green	Orange	Red
Global Warming Potential *	Green	Orange	Light Green	Red
Freshwater eutrophication	Green	Light Green	Orange	Red
Marine eutrophication	Green	Light Green	Orange	Orange
Terrestrial eutrophication	Green	Light Green	Red	Orange
Eco-toxicity	Green	Light Green	Red	Orange
Fossil fuel depletion *	Light Green	Red	Green	Orange
Depletion of other non-renewable resources	Green	Light Green	Red	Orange
Acidification	Green	Light Green	Red	Orange
Particulate matter emissions	Green	Light Green	Red	Orange

* The Global Warming Potential and fossil fuel depletion calculations use the current UK energy mix. If renewable energy were to be used for the processing of the feed, feed would score better on these aspects.

ENVIRONMENTAL BENEFITS



FEED BACK

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REFERENCES

- i. Salemdeeb, R., zu Ermgassen, E. K., Kim, M. H., Balmford, A., & Al-Tabbaa, A. (2016). Environmental and health impacts of using food waste as animal feed: a comparative analysis of food waste management options. *Journal of Cleaner Production*.
- ii. Zu Ermgassen, E. K., Phalan, B., Green, R. E., & Balmford, A. (2016). Reducing the land use of EU pork production: where there's swill, there's a way. *Food policy*, 58, 35-48.
- iii. Amazonian trees are a conservative estimate based on over 40% of EU soybean imports coming from Brazil (EC figures) and using the lowest average tree density in the Amazon out of 4 peer reviewed studies.

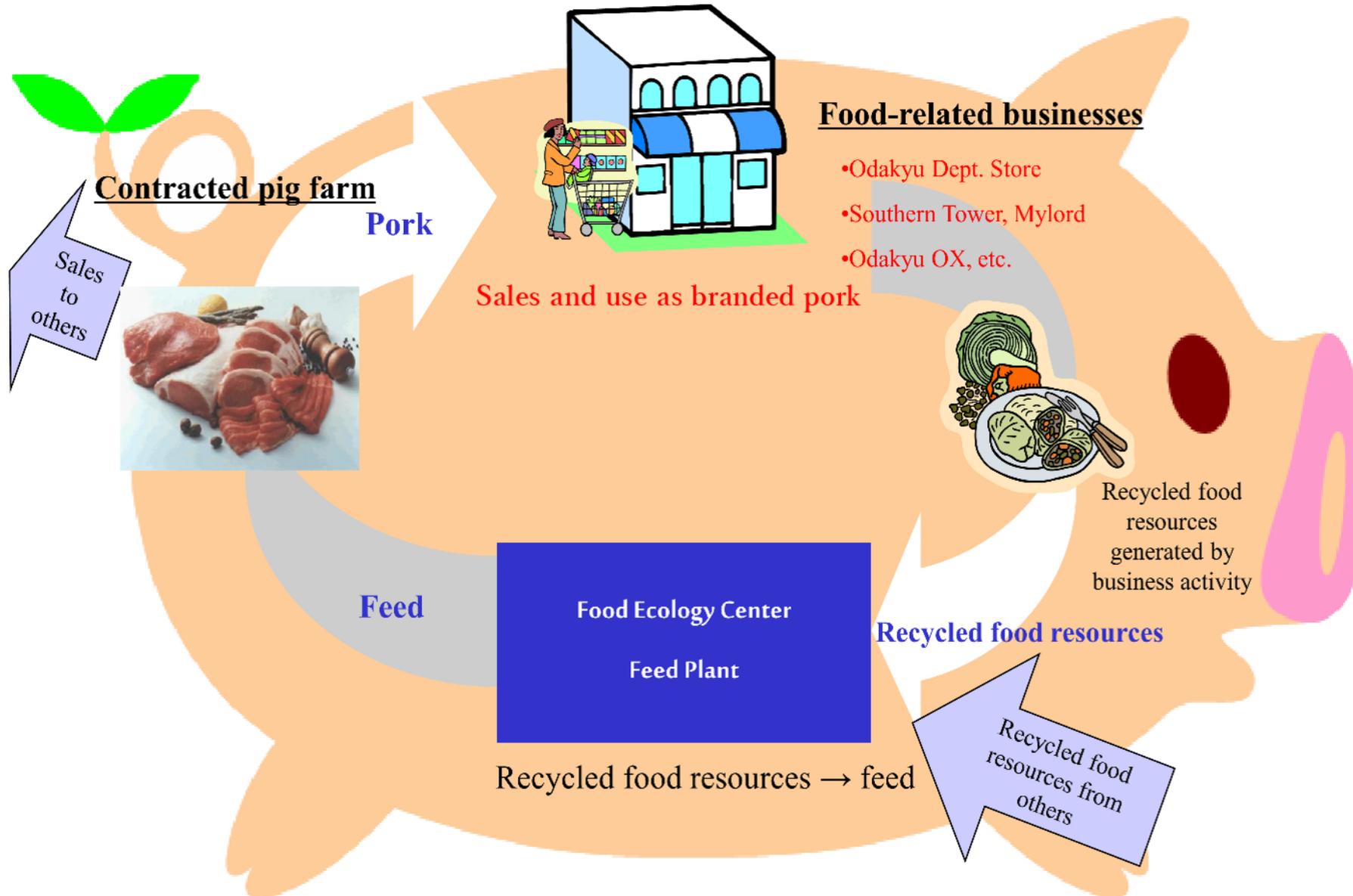
References available upon request.



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JAPAN FOOD ECOLOGY CENTER.INC: A MODEL FOR REPLICATION in the EU

<http://www.japan-fec.co.jp/>



Plant outline

Item	Description		
Facility name	Japan Food Ecology Center (Tel : 042-777-6316 Fax : 042-777-6317)		
Location	1-17-13 Tanashioda, Sagamihara City (plant site) 1-10215-6 Tanashioda, Sagamihara City (parking lot)		
Land-use classification	Urban zone, restricted industrial zone		
Area	Plant Site area: 1,527 m ² Structural area: 909.5 m ² Parking lot Site area: 1,325 m ²		
Waste items handled	Animal and plant residues, waste acid, waste alkali, sludge (food only) General waste (kitchen waste)		
Treatment method & capacity	Heat treatment Conversion into feed (shredding, fermentation) 39 tons/day		
Operating time	Shipping and receiving hours: 8:00 A.M. to 5:00 P.M. Operates 365 days/year		
Acquired permits, etc.	Permit to establish a general waste treatment facility (Sagamihara City)	October 25, 2005	Permit No.: C0167701 Sagamihara City ordinance (waste designation 1) No. 67
	Permit to operate a general waste disposal business (Sagamihara City)	December 6, 2005	Sagamihara Permit No. B0167 General waste disposal business Sagamihara City ordinance (waste designation 1) No. 69
	Permit to operate an industrial waste disposal business (Sagamihara City)	December 6, 2005	Permit No.: 09820121593
	Certificate of registration of recycling business Ministry of the Environment; Ministry of Agriculture, Forestry and Fisheries	March 3, 2006	Registration No.: 14-4

Japan Food Ecology Center



Affiliated transport company collects waste from food factories, etc.



Special refrigerated car brings waste to the Food Ecology Center



Input data (quantity) for each office by bar code system



2) Measure

1) Transport of recycled food resources



3) Input of material

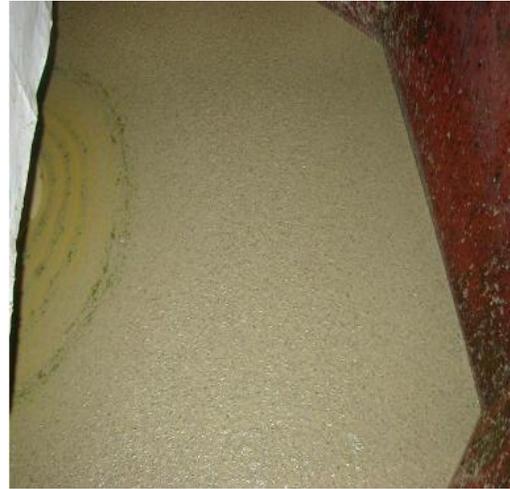


4) Sorting

Japan Food Ecology Center



5) Shredding



After shredding (in primary tank)



6) Sterilization



7) Fermentative treatment



8) Transport feed by tank truck



Feeding

Japan Food Ecology Centre: Reported benefits of liquid fermented feed

1) Liquid (paste-like) feed is inexpensive

Liquid fermented feed lowers energy costs by using the moisture of high-quality recycled food resources such as milk and yoghurt. This makes it possible to provide liquid feed for about half the price of general blended feeds.

2) Controls odors by animal excreta

Because the feed is in liquid form, it is easily digested by animals, meaning that no excess nitrogen is released. This reduces the ammonia odor of animal excreta.

3) Lowers disease rates

Because lactic acid bacteria in the feed works to increase good bacteria in the intestines, the feed improves immunity and encourages regular function of the intestines. Moreover, because it produces no dust, it improves the working environment for people by lowering the incidence rates of pneumonia and other diseases.

4) Provides consumers with safe and healthy pork

Because pigs fed with liquid fermented feed have lower disease rates, fewer antibiotics must be administered to them. This makes it possible to supply consumers with safe and healthy pork.



Watch food waste hero pigs “de Groene Varkens” enjoy eating surplus food here:

<http://www.rtvdrenthe.nl/nieuws/120099/Varkens-krijgen-verjaardagfeestje-in-Loon>

With thanks to Anita and her lovely Groene Varkens / Green Pigs of CountrySmile,
The Netherlands

<http://www.countrysmile.nl/>
[@CountrySmileNL](https://www.instagram.com/CountrySmileNL)

