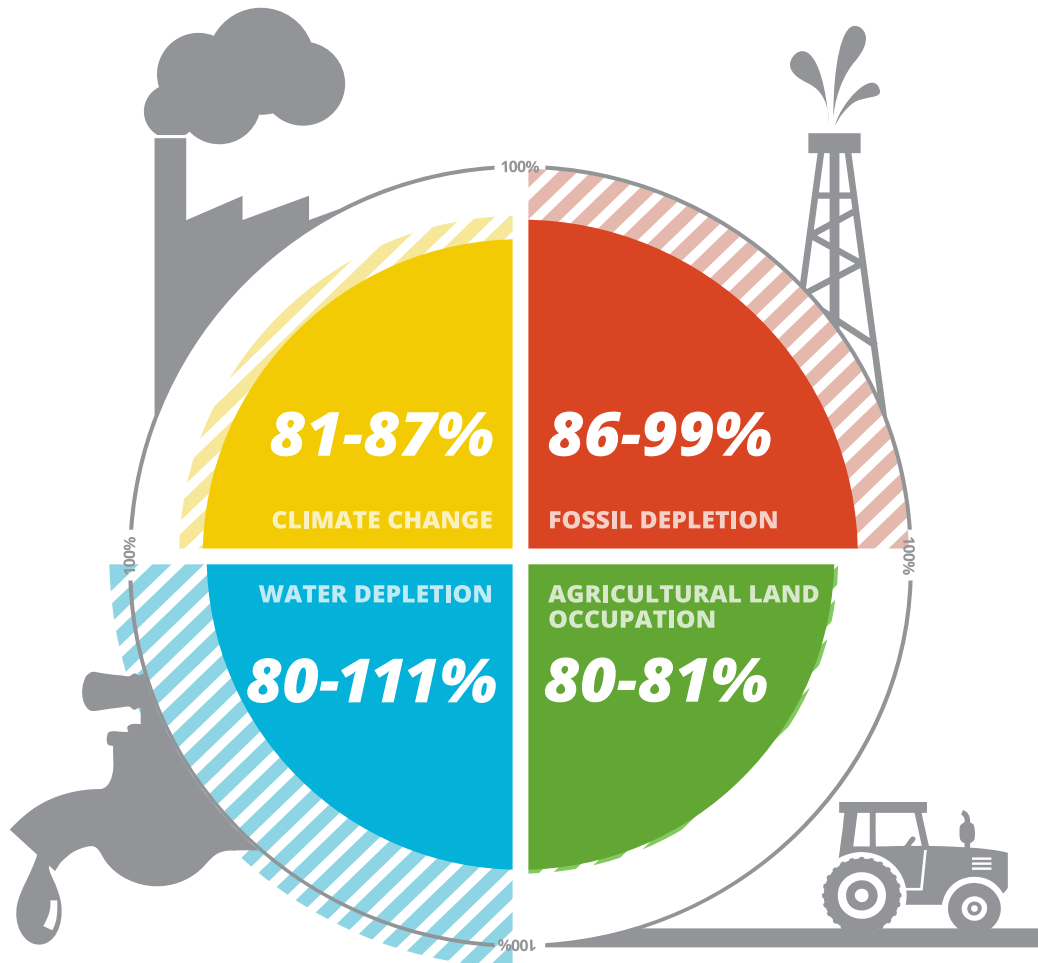


PERFORMANCE REPORT

ENVIRONMENTAL PERFORMANCE OF MEATLESS

FIGURE 1: THE ENVIRONMENTAL PERFORMANCE OF MEATLESS PRODUCTS COMPARED WITH MEAT (100%)



Meatless is a pioneer and front runner in the field of hybrid products

Meatless products make a significant contribution to reducing climate change, fossil depletion and agricultural land use, without the difficulty of having to change consumer diets.

Meatless is a flake made from 100% plant-based raw materials, such as wheat, lupin, rice and tapioca, and is available as a hydrated and as a dehydrated product.

Meatless can be combined with animal-based raw materials, to create so called hybrid products.

Consuming hybrid products has the potential to significantly reduce the environmental impact of processed animal products. Hybrid products made with Meatless also contain significantly less fat and calories without any change in succulence or taste.

Profile and key figures

Meatless is a flake made from 100% plant-based raw materials, such as wheat, lupin, rice and tapioca. It is a semi-manufactured product and can be included in the recipes of products made with animal-based raw materials, such as processed meat products or cheese, without influencing texture or taste. Meatless flakes are also used in vegetarian products to improve texture and juiciness.

The life cycle of the production of Meatless starts with the cultivation of crops. The wheat for Meatless is cultivated in the Netherlands, the rice is cultivated in China and the tapioca is cultivated in Thailand. Meatless also contains an ingredient based on seaweed (technical aid), which is imported either from China or from France. As the environmental impact of this ingredient is not well documented it has been estimated from the electricity consumption for production plus the transport to the Netherlands.

Meatless flakes are made in the Netherlands in a high volume continuous production system and delivered to the food industry worldwide.

Hybrid products

Hybrid products using Meatless can be made in two ways: using hydrated (wet) flakes, which are delivered and processed frozen, or rehydrated (dry) flakes. A hybrid product made with hydrated Meatless typically consists of 20% Meatless and 80% meat (other recipes are possible) and does not require the addition of water. When rehydrated dry flakes are used, a hybrid product consists of 3% Meatless, 80% meat and 17% water. The flakes are rehydrated before processing into the meat product. The environmental impact of the manufacturing of the hybrid product has been estimated from the energy consumption of the average meat processing industry.

FIGURE 2: ORIGIN OF MAIN INGREDIENTS OF MEATLESS

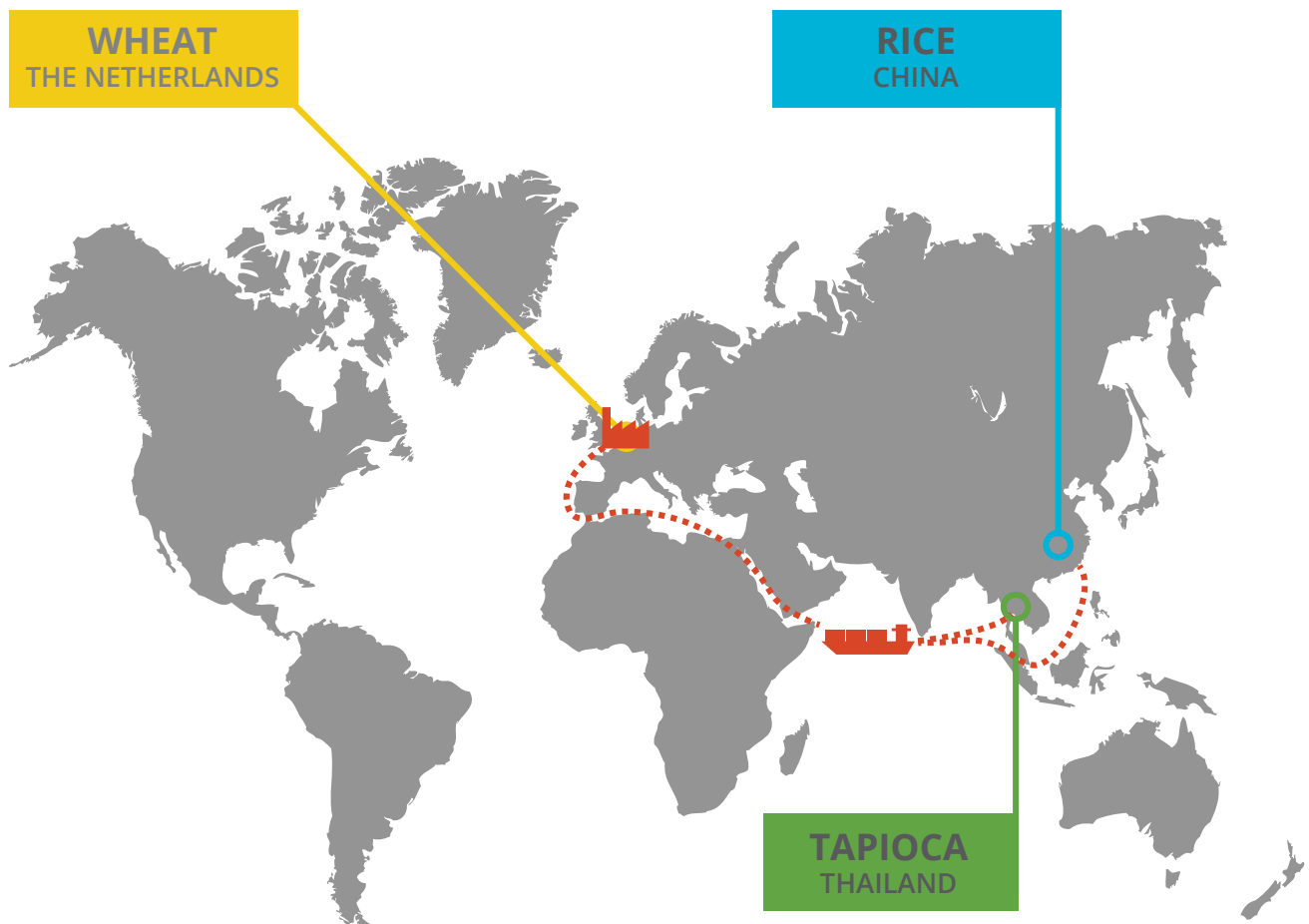


FIGURE 3: PRODUCT PERFORMANCE OF MEATLESS FLAKES

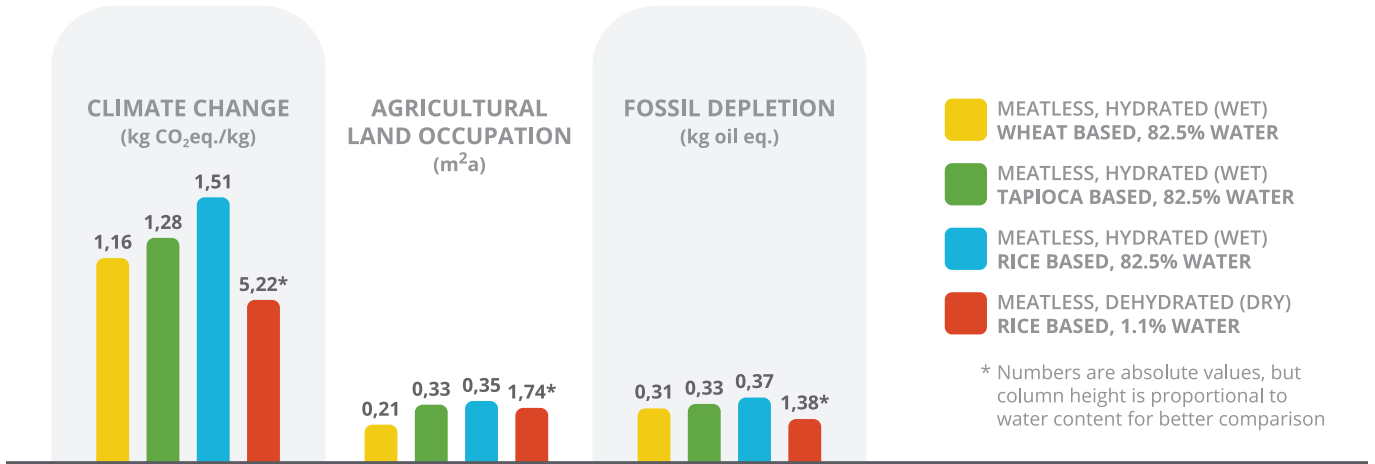


TABLE 1: LIFE CYCLE INVENTORY DATA FOR THE PRODUCTION OF ONE TONNE OF MEATLESS

	UNIT	MADE FROM WHEAT (HYDRATED)	MADE FROM RICE (HYDRATED)	MADE FROM TAPIOCA (HYDRATED)	MADE FROM RICE (DEHYDRATED)
Wheat flour	kg/ tonne Meatless	160	0	0	0
White rice	kg/ tonne Meatless	0	160	0	825
Tapioca starch	kg/ tonne Meatless	0	0	160	0
Technical aid	kg/ tonne Meatless	15	15	15	75
Water	kg/ tonne Meatless	825	825	825	10
Natural gas	m ³ / tonne Meatless	35.7	35.7	35.7	995
Electricity	kWh/ tonne Meatless	140	140	140	155
Liquid nitrogen	kg/ tonne Meatless	1700	1700	1700	0

FIGURE 4: PROPORTION OF INGREDIENTS IN HYBRID PRODUCTS MADE FROM HYDRATED AND DEHYDRATED FLAKES

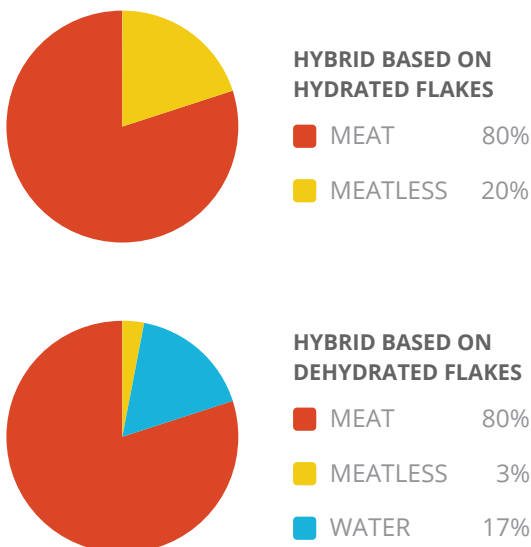
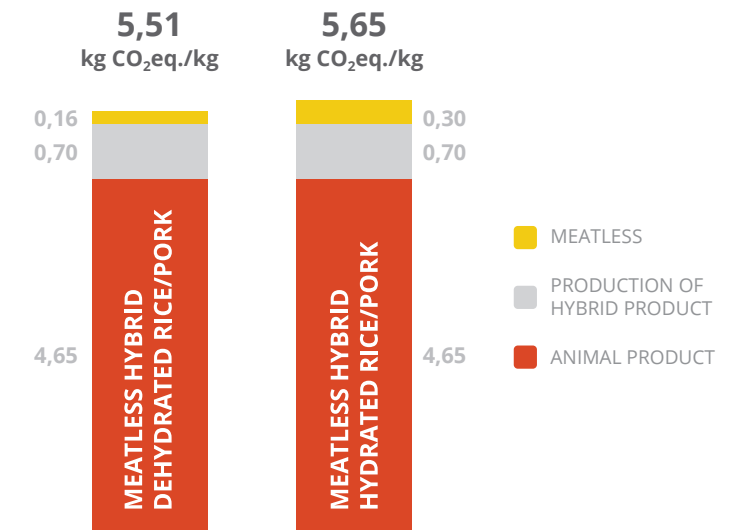


FIGURE 5: IMPACT ON CLIMATE CHANGE FOR THE PRODUCTION OF PORK HYBRIDS MADE FROM HYDRATED AND DEHYDRATED FLAKES



Meatless hybrid products compared with meat

For this analysis we used hybrid products in which Meatless made from wheat, rice and tapioca was combined with pork, beef and chicken meat. The methodology used is explained in the Agri-footprint® methodology report (Blonk Agri-footprint BV, 2014).

Hybrid products based on Meatless have a lower environmental impact on climate change and agricultural land occupation than meat, because Meatless replaces meat. This means that part of the emissions from animal husbandry (e.g. due to manure management and enteric

fermentation) are replaced with emissions from the production of Meatless. The impact on water depletion is lower for beef hybrids, but Meatless made from rice has a higher impact on water depletion than Meatless made from wheat or tapioca. This is due to the water consumption during the cultivation of rice. The impact on fossil depletion of the hybrid products is lower than of the impact of meat.

The impact on other environmental indicators can be calculated using SimaPro and Agri-footprint®.

FIGURE 6: RELATIVE REDUCTION OF ENVIRONMENTAL IMPACT COMPARED WITH FULL MEAT EQUIVALENTS



Limitations

Hybrid products made with Meatless often contain additional ingredients, such as spices and herbs. These ingredients were not taken into account in this analysis; they are mostly similar to the additional ingredients in the non-hybrid 100% meat products. The processing data for the manufacturing of the hybrid product are based on the average energy consumption of the Dutch meat processing industry. These figures can vary greatly between different plants.

The various proposed Meatless products are different nutritionally. Consumers will make their choice from this spectrum depending on their functional and qualitative needs for a certain meal. In addition, meat substitutes can hardly be compared with fresh meat. There is also a difference in nutritional value derived from protein or fat content, which might warrant a comparison based on certain essential nutrients or nutrient density. Product preparation has not been taken into account. Preparation of fresh meat might have a higher environmental impact than preparation of already processed hybrid products and/or meat substitutes.

References

Blonk Agri-footprint BV (2014). Agri-Footprint - Part 1 - Methodology and basic principles - Version 1.0. Gouda, Netherlands. Retrieved from <http://www.agri-footprint.com/methodology/methodology-report.html>

For more information on Meatless, visit www.meatless.nl.

Disclaimer

The data used for this analysis have not been verified or validated. Blonk Consultants shall in no event be liable for any direct or indirect damages and/or loss due to the data and environmental impact results presented in this report. The comparison presented in this report is not a comparative assertion as stated in ISO 14040.

About Agri-footprint®

Agri-footprint® is a Life Cycle Inventory (LCI) database developed by Blonk Consultants that contains data on many agricultural products (feed, food and biomass). It is used by life cycle assessment (LCA) practitioners who have access to SimaPro. Companies in the agri-food sector can use Agri-footprint®, but they can also be a part of it. Front runners are encouraged to make their data available in Agri-footprint®.

The Agri-footprint® Performance Report shows why a (brand) product is a front runner in the field of sustainable products. The full Life Cycle Inventory is published in the Agri-footprint® database and the Life Cycle Impact Assessment can be reproduced using SimaPro. Data and references are documented in Part 2 of the Agri-footprint documentation: Description of data. For more information please check www.agri-footprint.com or call 0031-182-579970.

About Blonk Consultants

Blonk Consultants helps companies, governments and civil society organisations put sustainability into practice. Our team of dedicated consultants works closely with our clients to deliver clear and practical advice based on sound, independent research. To ensure optimal outcomes we take an integrated approach that encompasses the whole production chain.

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