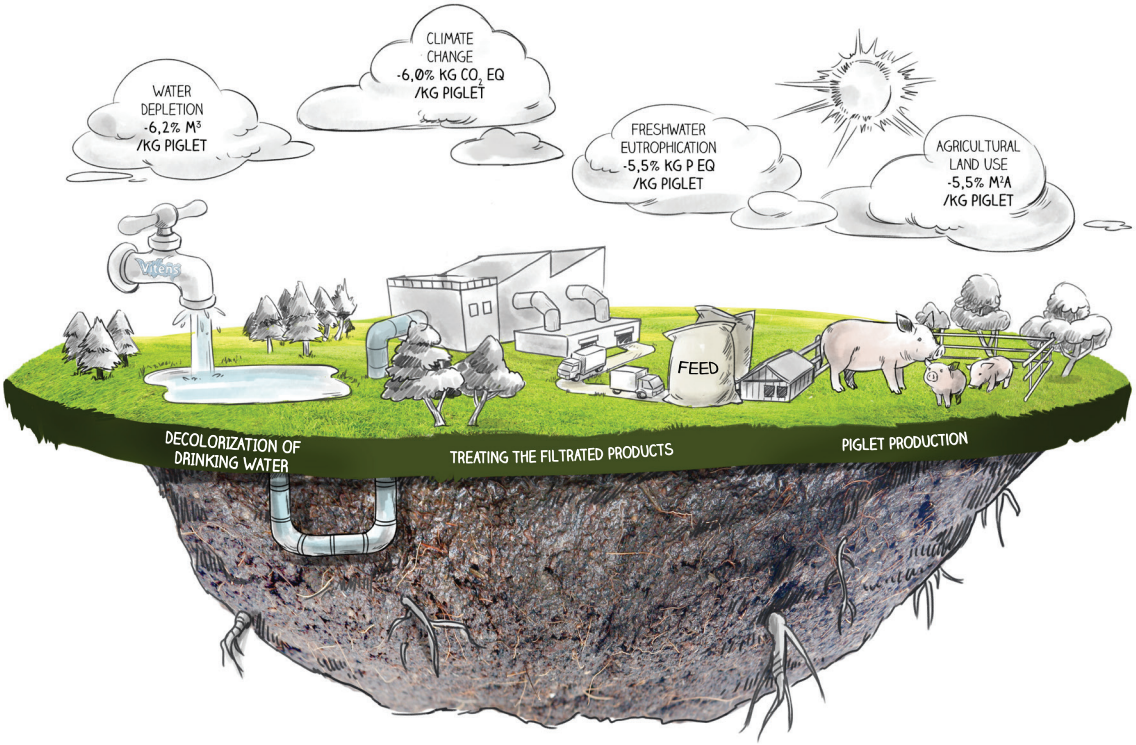
agri footprint
understanding the impact of food

# PERFORMANCE REPORT

*ENVIRONMENTAL PERFORMANCE OF HUMVI, A PRODUCT OF HUMIC AND FULVIC ACIDS*




## *ADDING HUMVI TO THE FEED COMPOSITION SIGNIFICANTLY REDUCES THE ENVIRONMENTAL IMPACT OF PIGLET PRODUCTION*

**Adding 1.5% HumVi in the feed for piglet production highly reduces the impact of piglet production on climate change, freshwater eutrophication, agricultural land use and water depletion.**

HumVi is a product of humic and fulvic acids derived from drinking water. Humic and fulvic acids are the main component of humic substances, which are primarily subtracted from any well-decomposed organic material, such as leonardite (brown coal) or composts. HumVi is the first product known, whereby the humic and fulvic acids are purified from drinking water. Using HumVi as growth-promoting agent in animal nutrition can be beneficial for animal production.

# Profile and key figures

**HumVi is a product produced by Vitens containing humic and fulvic acids. These substances are filtrated as byproduct to decolor drinking water. HumVi can be added to animal feed as a growth-promoting agent. There are indications that HumVi applied to the soil has beneficial effects on plant and root growth.**

The life cycle of the production of HumVi by Vitens starts by filtration of drinking water, which takes place in Oldeholtpade (10%), Sint Jansklooster (12.5%) and Spannenburg (77.5%). All filtrated products are treated at the Spannenburg installation, and therefore the filtrate of Oldeholtpade and Sint Jansklooster are transported to Spannenburg. During the manufacturing process of HumVi, electricity is consumed. Per tonne of HumVi produced, 87.5 kWh is used.

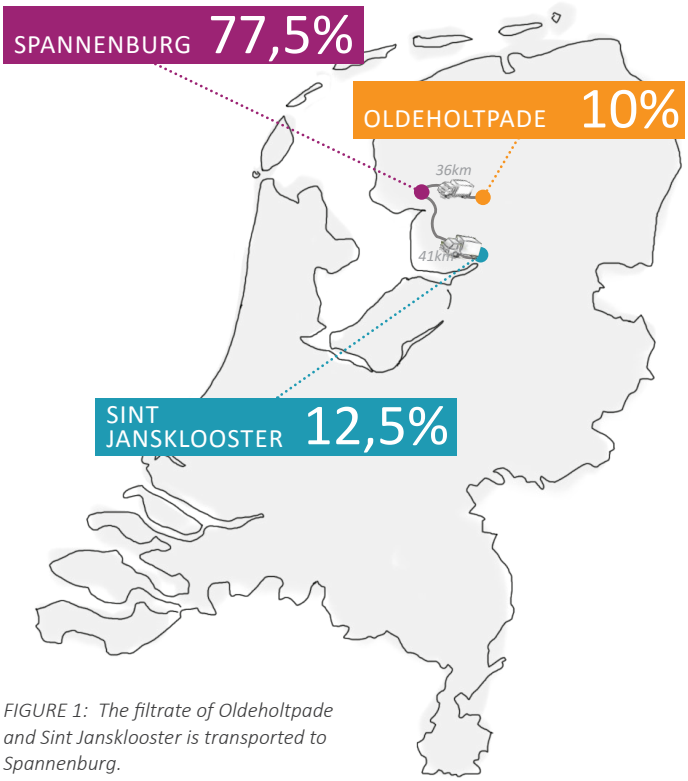



*FIGURE 1: The filtrate of Oldeholtpade and Sint Jansklooster is transported to Spannenburg.*

Benefits of using humic and fulvic acids have been reported for plant growth, pig performance and egg production by laying hens, but the effects of adding HumVi as a growth-promoting agent to pigfeed in the production of piglets have been well investigated and documented.

## Piglet production system

In the piglet production system, the composition of the pig feed is altered when adding HumVi and two parameters of production system change: feed intake and weight of the piglets. In experiments the barley content of the pig feed was reduced, as well as the salt and sodium bicarbonate. Based on dry matter, 1.5% HumVi was added to the feed composition. Feed intake was increased by approximately 7%. The weight of the piglets increased by a little over 7.5% per piglet.

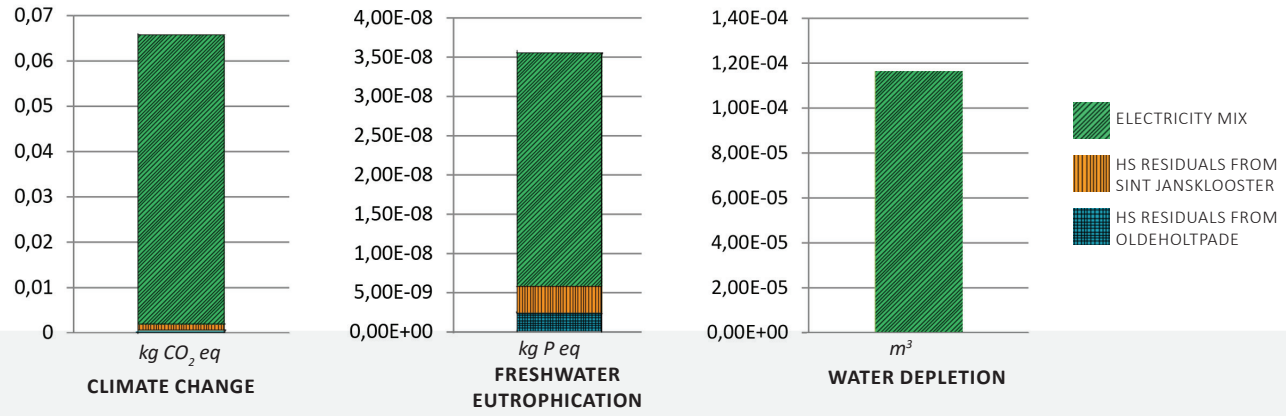



*FIGURE 2: Product performance of 1 kg of HumVi, produced via filtration of drinking water by Vitens*

The impact of the production of HumVi by Vitens on climate change is a little under 0.066 kg $CO_2$ eq per kg, which is mainly caused by the production of electricity and the production and combustion of fuels to do so. The impact on freshwater eutrophication is 3.56*10-8 kg P eq. per kg. This is also mainly caused by the production of electricity which is required for production of HumVi, but also by the transport of humic acid and fulvic acid residuals between extraction locations Sint Jansklooster and Oldeholtpade and the production location Spannenburg. The impact on water depletion is 1.16*10-4 $m^3$ per kg. Agricultural land use is not significant to produce HumVi, but will be relevant for the use of HumVi in animal feed.

*TABLE 1: Pig feed composition when applying HumVi in the production of piglets, compared to a control feed.*

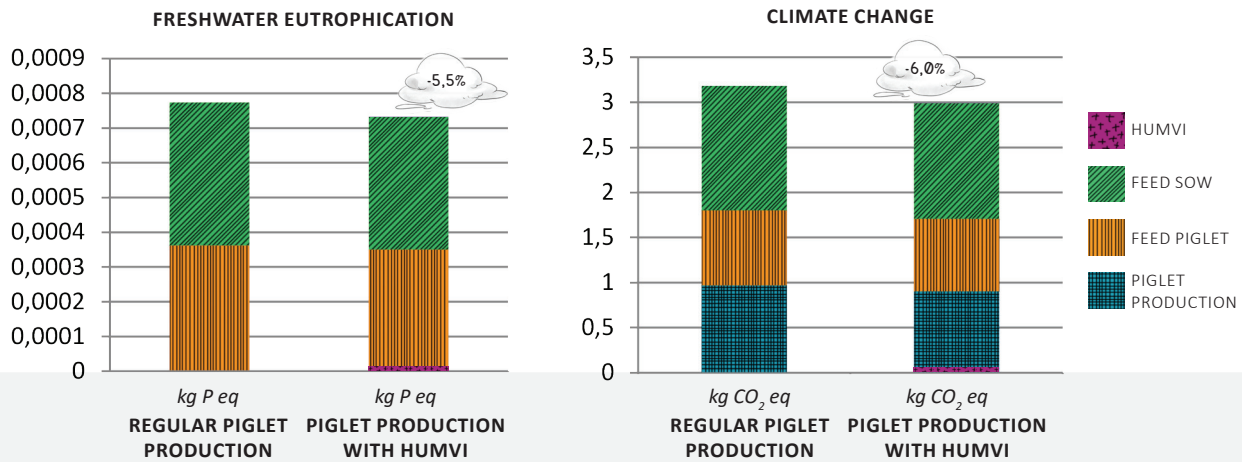
| Feed components | Unit | Control pig feed | Pig feed with 1,5% HumVi |
|---|---|---|---|
| Humic Acid | gram | 0.0 | 17.4 |
| Barley | gram | 362.9 | 350.6 |
| Wheat | gram | 159.0 | 159.3 |
| Maize | gram | 115.6 | 115.7 |
| Oatmeal | gram | 115.6 | 115.7 |
| Potato protein | gram | 68.3 | 68.4 |
| Soy protein concentrate | gram | 58.9 | 59.0 |
| Soybean meal | gram | 56.6 | 56.7 |
| Calcium carbonate | gram | 13.6 | 13.7 |
| Sugar beet molasses | gram | 11.6 | 11.6 |
| Water | gram | 11.6 | 11.6 |
| Beef feed grade | gram | 11.1 | 11.1 |
| Monocalcium phosphate | gram | 9.2 | 9.3 |
| Sodium bicarbonate | gram | 5.9 | 0.0 |

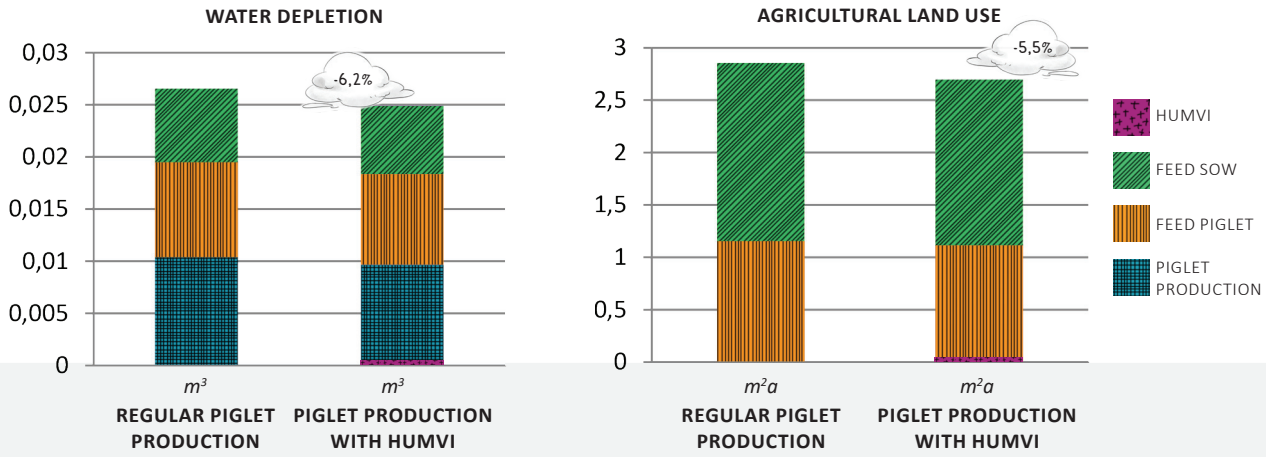
# Piglet production with HumVi compared to regular piglet production

**The feed composition and a few parameters for piglet's production were changed on the basis of experiments carried out by Van Oostrum & Benthem de Grave (2013). They assessed the impact of using HumVi on piglet production by comparing two experimental setups with different feed composition. The methodology used is explained in the Agri-footprint® methodology report (Blonk Agri-footprint BV, 2015).**

By incorporating HumVi into the feed composition of the feed for the piglets, the feed intake increased from 783 kg to 838 kg per annually present sow. The end weight of the piglets increased from 25.1 kg to 27 kg per piglet.

*FIGURE 3: Contribution analysis to produce 1 kg of piglet (live weight) comparing the use of HumVi in the feed to regular production, for 4 impact categories.*






HumVi reduces the environmental impact on all relevant indicators for piglet production. Using HumVi in the feed for production of piglets reduces the impact on climate change by 6.0% compared to regular piglet production. Water depletion is reduced by 6.2%, while freshwater eutrophication and agricultural land occupation are reduced by approximately 5.5%.

There are approximately 5.600.000 piglets weighing less than 20kg in the Netherlands (2016). The annual reduced environmental impact of using HumVi is comparable to driving around the world in a car 3550 times, the surface of 2600 soccer fields or the annual water use of almost 1200 Dutch households.

*TABLE 2: Explanation of the impact categories*

| Impact category | Unit | Relevant because: |
|---|---|---|
| Climate change | kg $CO_2$ equivalents | Climate change heats up the earth slowly, which has an impact on the quality of life on earth. $CO_2$ is one of the greenhouse gases that has an impact on climate change. All other gases with an impact on climate change are also included and expressed in equivalents with the same impact as $CO_2$. |
| Agricultural land use | $m^2$ annual | The area of land on the globe available for cultivation is limited. Land must be used as efficiently as possible. Lowering the impact means minimizing the number of square meters ($m^2$) per year used to produce a product. |
| Freshwater eutrophication | kg P equivalents | Phosphate is an important substance for the fertility of the soil. Eutrophication means leaching to ground- and surface water. This has harmful consequences for nature and health. |
| Water depletion | $m^3$ | Water is an important resource for life on earth. Therefor an economical use of water is needed. This impact category does not consider water scarcity per region. |

# Limitations

For piglet's production, it is assumed that the Dutch pig farm from the Agri-footprint database is representative to the pig production system. This system has been adapted to the experiments and results as reported by Van Oostrum and Benthem de Grave (2013).
There is still a lack of data on the effect of HumVi on cropping systems and other animal systems. Therefore this assessment was not enlarged to other systems than the piglet production system.

# References


Blonk Agri-footprint BV. (2015). *Agri-footprint 2.0 - Part 1 - Methodology and basic principles.* Gouda, the Netherlands.

Van Oostrum, M., & Benthem de Grave, X. (2013). *Het effect van HumVi op de productieprestaties en mestconsistentie van gespeende biggen: een pilotproef.*


For more information on HumVi, visit www.vitens.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 agrifood 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.


**Agri-footprint® & Blonk Consultants**

Gravin Beatrixstraat 34

2805 PJ Gouda

The Netherlands

**Telephone:** 0031 (0)182 579970

**Email:** info@blonkconsultants.nl

**Internet:** www.blonkconsultants.nl