# Lowering impacts of chicken meat through *Hermetia illucens* larvae supplementation in the feed?


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With support:



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# DIL OVERVIEW: FACTS AND FIGURES

- Founded 1983
- Employees 200
- Locations Quakenbrück (GER), Brussels (BEL), Karlsruhe (GER), Berlin (GER),
- Legal status registered association
- Director Dr. Volker Heinz

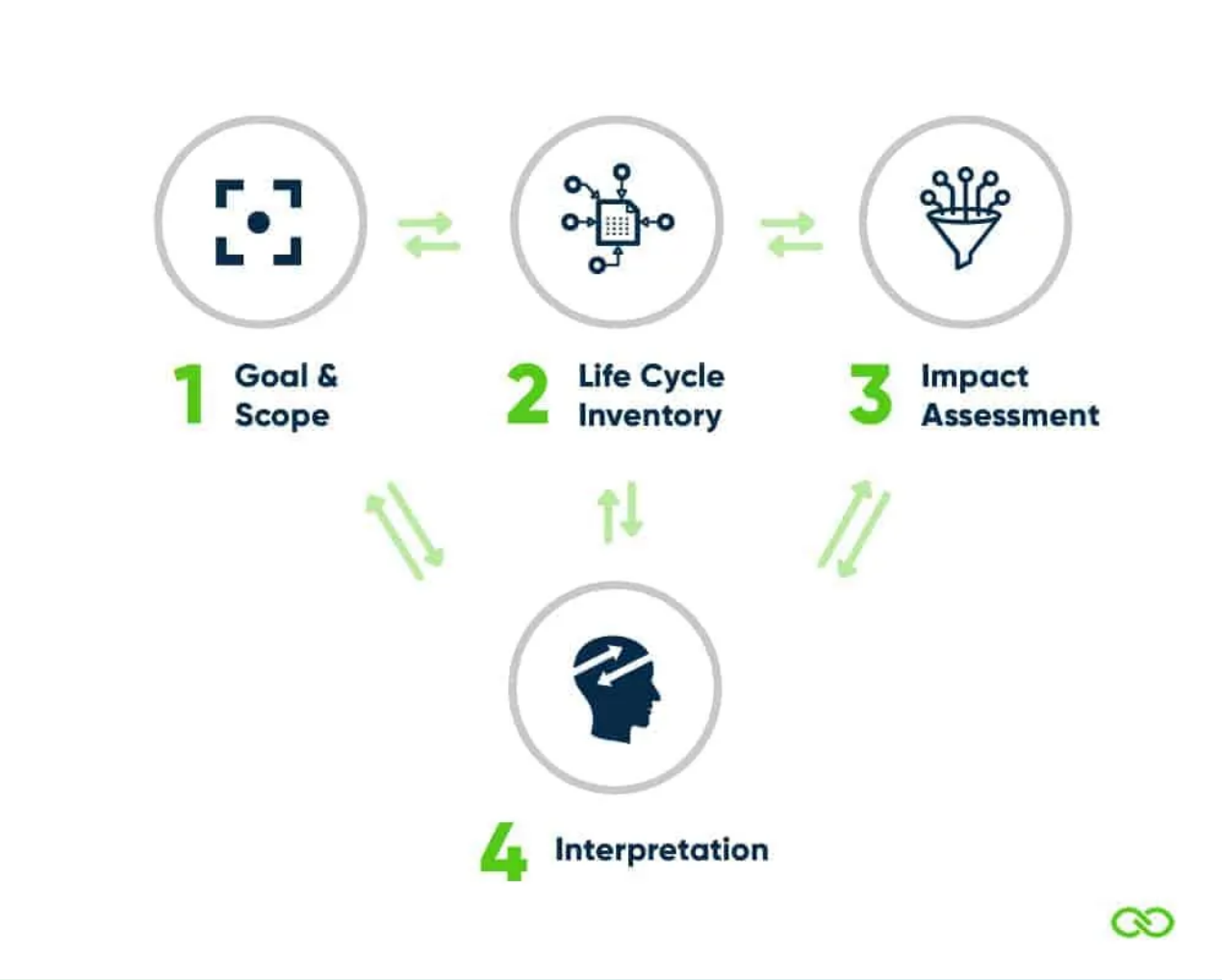
# EXPERIMENT SETUP

- The slow-growing Label Naked Neck chicken variety (82 days to slaughter, no heating)

- 2 experimental groups based on feed:

    1. reared on commercial organic feed with the inclusion of 10% *Hermetia Illucens* larvae into feed (BSFL)
    2. reared only on commercial organic feed.

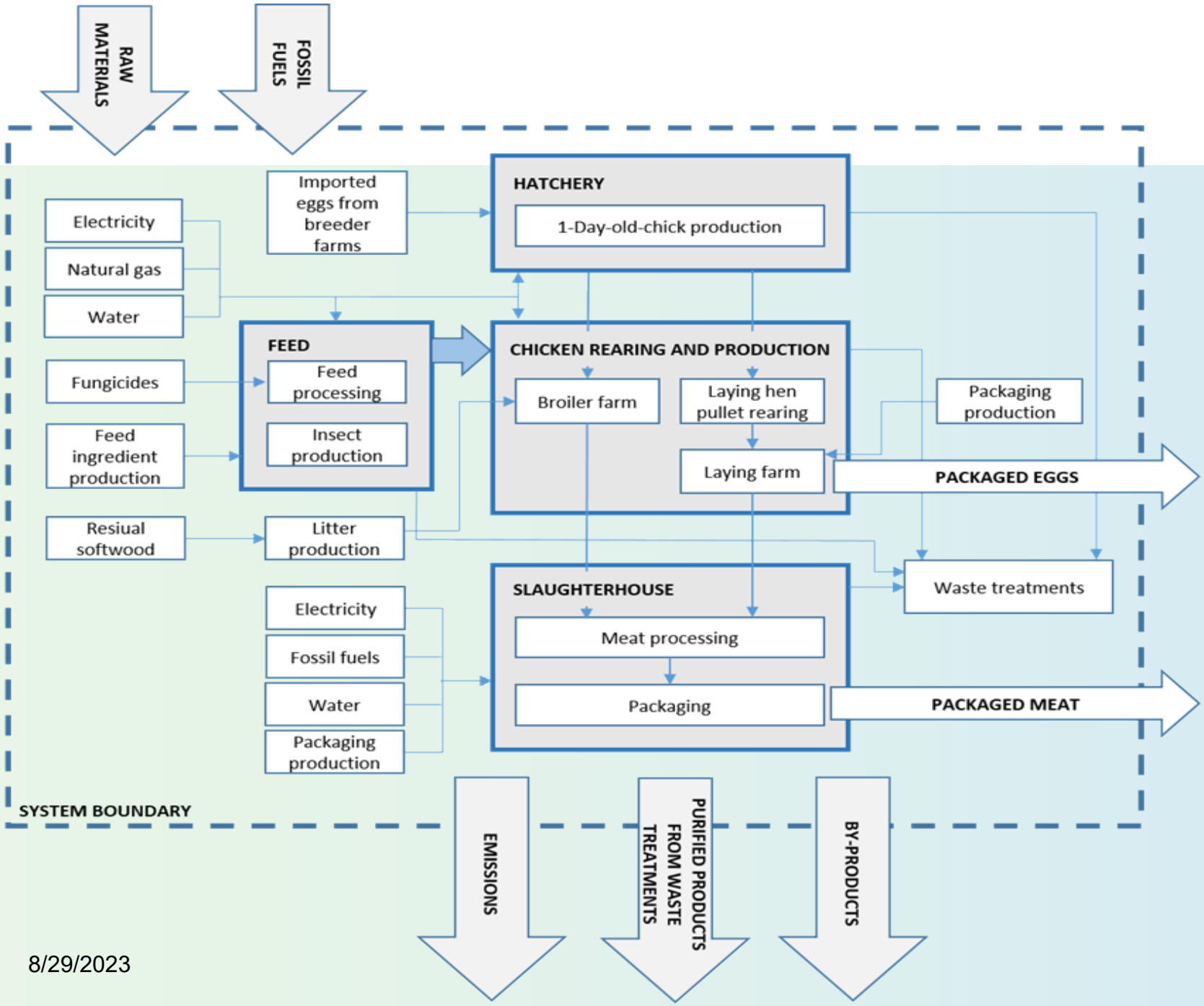
# LCA STAGES




Picture source: https://ecochain.com/knowledge/life-cycle-assessment-lca-guide/

# GOAL AND SCOPE

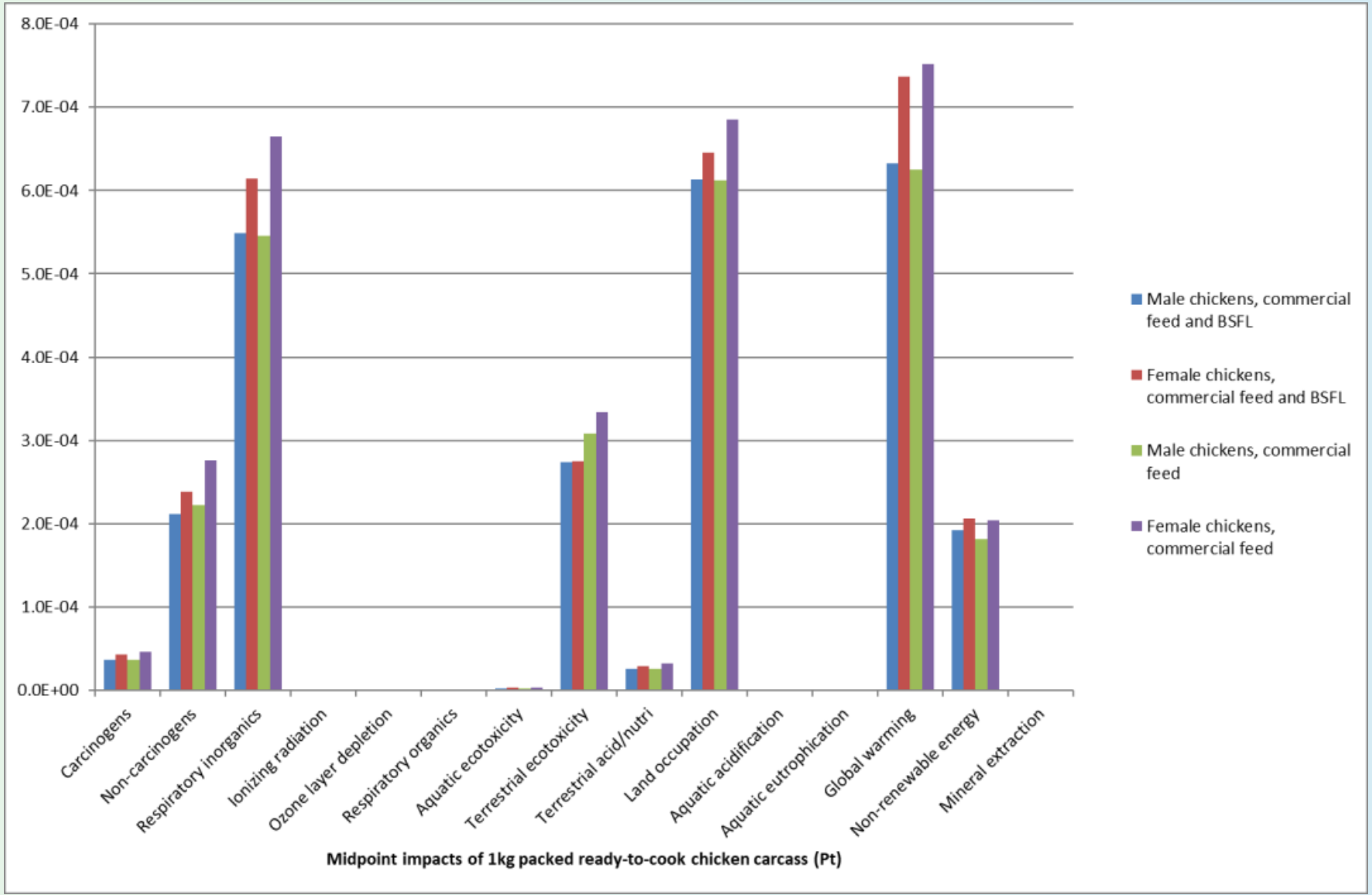
- Modular and attributional life cycle assessment (LCA) was developed to assure a structured and quantitative approach
- Cradle-to-slaughterhouse gate perspective with further extensions to waste treatments, thus including feed production, larvae production, hatchery, poultry production, and slaughterhouse


RAW MATERIALS
FOSSIL FUELS
Imported eggs from breeder farms
HATCHERY
1-Day-old-chick production
Electricity
Natural gas
Water
FEED
Feed processing
Insect production
Fungicides
Feed ingredient production
Resiual softwood
Litter production
CHICKEN REARING AND PRODUCTION
Broiler farm
Laying hen pullet rearing
Laying farm
Packaging production
PACKAGED EGGS
Waste treatments
SLAUGHTERHOUSE
Meat processing
Packaging
PACKAGED MEAT
Electricity
Fossil fuels
Water
Packaging production
SYSTEM BOUNDARY
EMISSIONS
PURIFIED PRODUCTS FROM WASTE TREATMENTS
BY-PRODUCTS

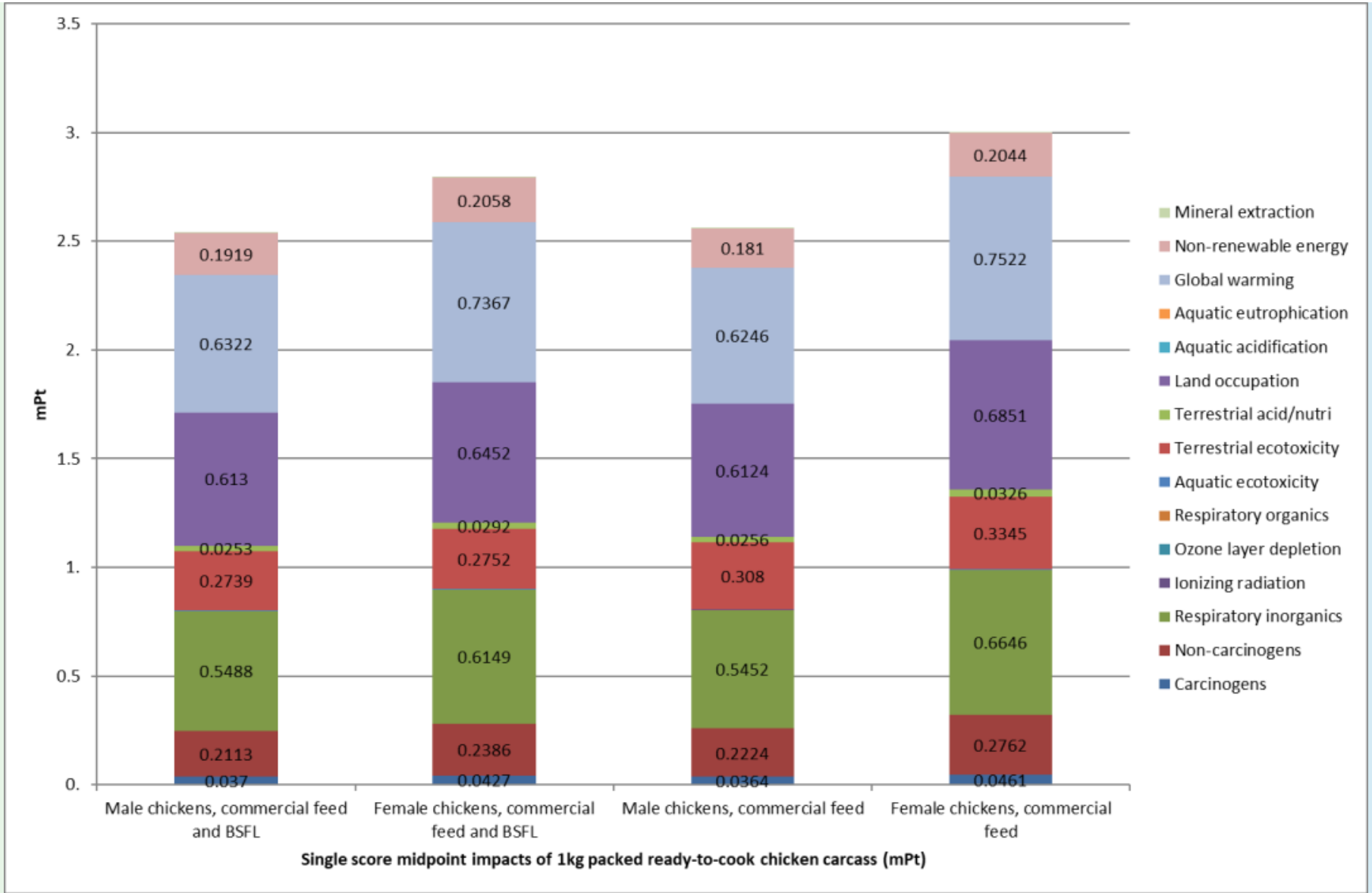
# INVENTORY ANALYSIS

- The results are based on experimental data collected from the project partners, partly extended by the background data and data from the literature
- Calculations were done in SimaPro 8.5.2.0 (PRé Consultants, Netherlands)
- Background data were taken from the ecoinvent 3 (ecoinvent, Switzerland) and Agri-footprint (Agri-footprint, Netherlands) databases.
- Methodology - IMPACT 2002+
- 1kg of packed ready-to-cook chicken carcass was the functional unit

# LCA RESULTS


8.0E-04
7.0E-04
6.0E-04
5.0E-04
4.0E-04
3.0E-04
2.0E-04
1.0E-04
0.0E+00
Carcinogens
Non-carcinogens
Respiratory inorganics
Ionizing radiation
Ozone layer depletion
Respiratory organics
Aquatic ecotoxicity
Terrestrial ecotoxicity
Terrestrial acid/nutri
Land occupation
Aquatic acidification
Aquatic eutrophication
Global warming
Non-renewable energy
Mineral extraction
Male chickens, commercial feed and BSFL
Female chickens, commercial feed and BSFL
Male chickens, commercial feed
Female chickens, commercial feed
Midpoint impacts of 1kg packed ready-to-cook chicken carcass (Pt)

# LCA RESULTS


3.5
3.
2.5
2.
1.5
1.
0.5
0.
mPt
0.1919
0.6322
0.613
0.0253
0.2739
0.5488
0.2113
0.037
0.2058
0.7367
0.6452
0.0292
0.2752
0.6149
0.2386
0.0427
0.181
0.6246
0.6124
0.0256
0.308
0.5452
0.2224
0.0364
0.2044
0.7522
0.6851
0.0326
0.3345
0.6646
0.2762
0.0461
Male chickens, commercial feed and BSFL
Female chickens, commercial feed and BSFL
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Female chickens, commercial feed
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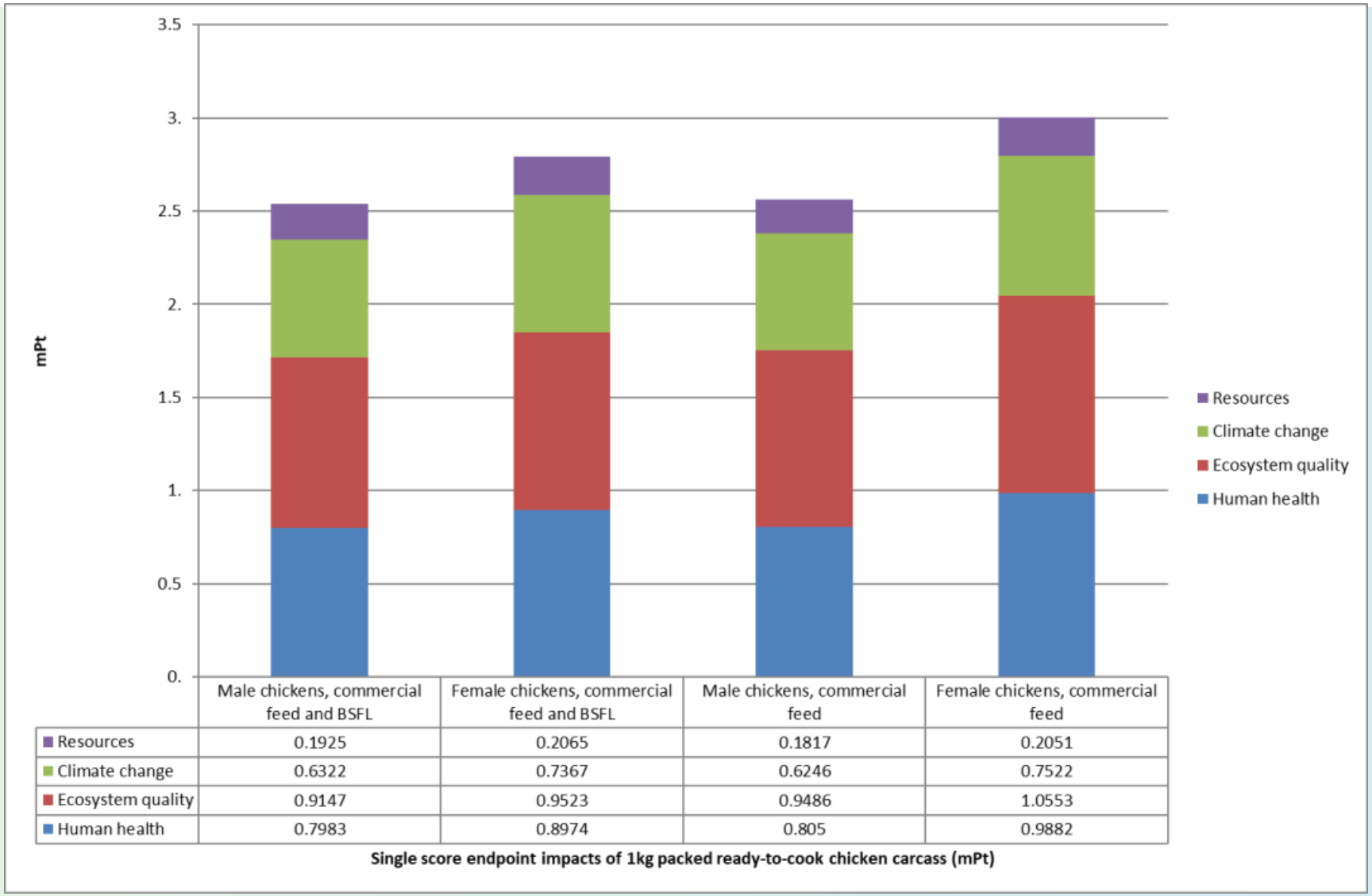
Aquatic ecotoxicity
Respiratory organics
Ozone layer depletion
Ionizing radiation
Respiratory inorganics
Non-carcinogens
Carcinogens
Single score midpoint impacts of 1kg packed ready-to-cook chicken carcass (mPt)

# LCA RESULTS




| | Male chickens, commercial feed and BSFL | Female chickens, commercial feed and BSFL | Male chickens, commercial feed | Female chickens, commercial feed |
|---|---|---|---|---|
| Resources | 0.1925 | 0.2065 | 0.1817 | 0.2051 |
| Climate change | 0.6322 | 0.7367 | 0.6246 | 0.7522 |
| Ecosystem quality | 0.9147 | 0.9523 | 0.9486 | 1.0553 |
| Human health | 0.7983 | 0.8974 | 0.805 | 0.9882 |

**Single score endpoint impacts of 1kg packed ready-to-cook chicken carcass (mPt)**

# CONCLUSIONS

- The inclusion of 10% of larvae into chicken feed did not lead to significant environmental gains
- The difference in impacts can be observed between the sexes
- Better results might be expected if insect feed were adjusted to overproduced fruits and vegetables, and if the portion of BSFL in broilers' diets were increased

# ACKNOWLEDGEMENTS

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# Thank you for your attention!

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