San Esteban S.A.
1 kg Beef Meat

Environmental Product Declaration

This EPD has been developed in conformity with ISO 14025.

From:
San Esteban S.A.
ARGENTINE MEAT

EPD registration number: S-P-07361
CPC code: 2111, 2113 Meat of mammals, fresh
Program: EPD International EPD® System
Program operator: EPD International AB
Publication date: 2024-01-29
Valid until: 2029-01-28
EDP Programme Information

Program:
The International EPD System
www.environdec.com
info@environdec.com

Contacts:
For additional information relative to San Esteban S.A. activities or in regard to this environmental declaration, please contact:
Paolo Fontana
sanesteban@gruposanesteban.com.ar

Product Category Rules (PCR)
PCR 2012:11: Meat of mammals (fresh, chilled or frozen)
PCR 2012:11 version 4.0, 2022-10-19

UN CPC code: 2111.2113

PCR review was conducted by: Adriana Del Borghi, Chair of The Technical Committee of the International EPD® System (www.environdec.com).

Life Cycle Assessment (LCA)
LCA accountability: Leticia Tuninetti, Instituto Nacional de Tecnología Industrial; Rodolfo Bongiovanni, Instituto Nacional de Tecnología Agropecuaria.

Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:
[ ] EPD verification by individual verifier.

Third-party verifier: Javier Martín Echazarreta Instituto Nacional de Tecnología Industrial (INTI).

Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third-party verifier:
[ ] Yes  [x] No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see ISO 14025.
About
San Esteban S.A.
Our Vision

To be the leading livestock company in Argentina
Produce meat of excellent quality
due to respect for the soil,
the natural environment and animal welfare.
San Esteban S.A. ("San Esteban" - 30° 54' 3.28'' S, 58° 31' 3.42'' W) is located in the area of Paso Gallo, on the banks of Provincial Route N. 28 in the Federal Department, in the **center-north of the Province of Entre Ríos**, its western limit is represented by the Gualeguay River, the north by the Caraballo Grande stream, to the south along Provincial Route n°28, to the east along a local road.

The property has a total area of **4024 hectares**.

In the Province of Entre Ríos three phytogeographic provinces converge, subdivided into five regions; The phytogeographic province that is represented in the San Esteban area is that of Espinal, the forests that make up the Espinal in the north of Entre Ríos are locally called **“Selva de Montiel”**, although they do not strictly constitute a jungle, are divided into two areas: **Montiel Xerophilous Forest 1** and **Grasslands dominated by grasses 2**.

**The complete cycle of cattle** (rearing, raising, fattening) **is carried out by the property as the main productive activity.** In addition, corn, grassland and sorghum are grown.
Marginal Forest of the Galeguay river

Caraballo Grande stream

Bushes ribereños

Semi-erophilous forest *

Scrublands

* It’s main components arboreal are: White Quebracho, (Aspidosperma ‘Quebracho-blanco), Espinillo (Vachellia Caven), Ñandubay (Prosopis affnis) and Black Carob (Prosopis nigra).
Our Mission and Our Values

San Esteban has a clear **mission**: the **production of high-quality beef** for the market with a balance between emission and removal of CO₂, guaranteeing the **highest health-nutritional standards** and ensuring **traceability** from the field to the table.

... by **findings the best balance** and respect between nature, food systems and biodiversity with a strong attention on environmental and social elements.

San Esteban to reach its mission is putting in place several actions **always respecting its values ...**

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**Long Term Ownership**

**Supply chain as a key priority**
- Continuing developing a production model that encourage transparency and traceability alongside the different actors (internal and external) across the supply chain.

**Environmental and animal welfare**
- Producing high quality beef for the market, minimizing environmental impacts and protecting the soil, respect of animal welfare across the entire life-cycle.

**Territory**
- Guarantee high-level professional conditions that enhance the workforce and encourage the permanence and return of people to rural areas.

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**People & Technology**

**People and technology** development has always been a fundamental combination for San Esteban and the basis of its future development.

**Ensure continuous training for all.**

Continuity through **careful management of generational change.**

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**Quality & Sustainability**

Our ability **to maintain** or **improve quality** over time minimizing impacts on the environment, society, and the economy.

Clear goals in line with Agenda ONU 2030 in terms of sustainability ambition the base for our future strategies:

- **SDGs (**)**
- **CO₂ neutrality**

(**) Sustainable Development Goals (UN in 2015)

... in line with the **SDGs**, objectives that have guided our activity and that translate into the quality of the animals we produce.
Product Information
1 kg bovine live weight
San Esteban Protocol

In line with our mission, over the years we have developed our own protocol for the meat sector which is based on two axes: achieving the nutritional return and producing sustainable meat with neutral CO₂ emission.

**San Esteban Protocol**

### Achieving Nutritional Return

**Animal Feed**

Diet based on natural prairies, alfalfa; winter cereals and grasses; silage, cereals and oilseeds produced on the farm.

**Food safety** and **Health Program** are at the heart of the project. The abolition of antibiotics and growth promoters is achieved through total self-production.

**Production of sustainable meat with neutral CO₂ emission**

- 80% free natural pasture, 20% controlled confined diet.
- 100% self-production with attention on:
  - Water leakages
  - Soil erosion
- 99% internal production, significantly reduces CO₂ emissions due to transport, External food allowed only for weanings animals.

The diet offers a higher amount of unsaturated fatty acids Ω3 and Vitamin E elements contained in large quantities in the grass.

**Health Program**

Preventive program without use antibiotics or growth promoters. Antibiotics allowed only for clinical diseases.

**Quality**

Defined constant quality through international scores that determine:

- Maturity - Marbling
- Flavor - Meat color
- Fat color - Terneza

Plus of the Angus which produces a very rich meat in myostatin.

**Green Balance**

Internal production of all the sewing seeds with the exception maize/soja seeds OGM and avoid or lower the use of agrochemicals insecticides and fungicides.

Limitation the Natural Area address to livestock > 50%.

- Animal load < 1.0 EV/ha.
- Minimization of water consumption.
- Soil conservation through the fight against erosion.

Achieving the goal of meat production in a environment **Carbon negative**.

Enhance the wooded and natural surface create a rotation between cereal crops, forage, leguminous and intercalary grasses capable of guaranteeing proper nutrition.

Convert vegetable proteins into animal proteins, more efficient with a higher biological value due to richness essential amino acids (lysine, methionine...).
San Esteban S.A. | Argentine Meat

Animal Feed

- We follow the entire life cycle of the animal.
- Our animals live in freedom in their natural habitat, 80% in the free natural landscape (mountain/meadow) and 20% in a corral with controlled feeding.
- They are raised 100% in the forest with native natural grasslands and cultivated pastures.
- The grazing planner (winter and summer greening) makes possible the regeneration of soil organic matter.
- Agricultural areas are sewed with the purpose of producing hay and cereals rich in starch, essential ingredients in the final part of the cycle to guarantee the flavor and tenderness characteristics necessary to obtain high-quality meat.
- Our meat has optimal levels of fatty acids for human consumption.

Green Balance

To obtain dry matter production that guarantees the production of meat of sustainable quality and with CO₂ neutral parameters, we use the following factors and cultivation practices:

A. We follow the following factors:
- carbon storage operated primarily by harvest Index,
- the size of the root system,
- the humification and mineralization coefficients,
- the initial organic matter content of the soil,
- the cover of ground with crop residues,
- ensure the highest number of days of covert ground,
- the use of processes aimed to maintain the structure of the soil,
- the presence of wooden areas,
- forest rejuvenation with aerial sowing.

B. We adopt the following practices:
- crop rotation (cereals / legumes),
- double crops during the year (winter cereal + corn or sorghum or soybean),
- sowing of perennial/multiannual prairies,
- adoption of minimum tillage techniques,
- adoption the green manure techniques.
• Preventive health program (vaccination) with ban of growth promoters. The use of antibiotics is only permitted in diseases situations.
• The diet offers a higher quantity of unsaturated fatty acids ω3 and Vitamin E as these elements are contained in large quantities both in grass and through integration with flaxseeds.
• Attention to animal welfare is also linked to the guarantee of safety and food quality in all phases of reproduction, weaning, fattening, growth, grazing, age, etc...

• The protocol of Sant Esteban is very focused on its three basic aspects that determine the quality that, combined with other factors, allow the slaughtered animals to supply high-quality cuts of meat.
• Quality is the sum of many factors that determine consumer appreciation: tenderness, juiciness, smell and texture; These factors depend mainly on the maturity of the carcass and the amount and distribution of marbling (intramuscular fat).
• In the case of Angus cattle, the characteristic of high amounts of myostatin must be remembered, which guarantees strong muscle growth with a high content of intramuscular marbling.
LCA Information
Production Chain

Feed Production
- Planting
- Spraying
- Fertilization
- Harvest

Implanted pastures and crops

Emissions to air
- to soil
- to water

Residues

Cattle Production
- Life cycle of cows and bulls
  - Breeding
  - Rearing
  - Fattening

live steers & heifers to produce beef

Emissions to air
- to soil
- to water

Residues

Inputs
- Seeds
- Agchemicals
- Fertilizers
- Diesel

Inputs
- Diesel
- Diet
- Supplements
The animals produced by San Esteban S.A. are slaughtered in slaughter house located about 200 km from the farmgate of the hacienda San Esteban S.A. and exported or consumed in the domestic market.

**Scope:** PCR bullet 4.3 (meat of mammals) allow to study to intermediate products the upstream process with the scope cradle to gate.

**Allocation:** Biofisical to upstream process.

**Database(s) and LCA software used:** Agri-footprint version 5.0; December 2019; ecoinvent 4.0. November 2022; SimaPro® 9.5.0.1 April 2023.

**General System Boundaries**
Enviromental Performance
## Environmental Performance Indicators (1/3)

### Impact category indicators of fresh, boneless, bovine beef, produced by San Esteban S.A.

*Declared Unit: 1 kg of packaged boneless beef, European breed.*

### Table: Impact categories of fresh, boneless, bovine beef produced by San Esteban S.A.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>UNIT</th>
<th>Feed production</th>
<th>Animal breeding</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global warming potential (GWP)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fossil</td>
<td>kg CO₂ eq.</td>
<td>4.58E+00</td>
<td>0.00E+00</td>
<td>4.58E+00</td>
</tr>
<tr>
<td>Biogenic</td>
<td>kg CO₂ eq.</td>
<td>4.72E-03</td>
<td>2.66E+01</td>
<td>2.66E+01</td>
</tr>
<tr>
<td>Land use and land transformation</td>
<td>kg CO₂ eq.</td>
<td>5.69E-03</td>
<td>0.00E+00</td>
<td>5.69E-03</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>kg CO₂ eq.</td>
<td>4.59E+00</td>
<td>2.66E+01</td>
<td>3.12E+01</td>
</tr>
<tr>
<td><strong>Ozone layer depletion (ODP)</strong></td>
<td>kg CFC 11 eq.</td>
<td>2.66E-07</td>
<td>0.00E+00</td>
<td>2.66E-07</td>
</tr>
<tr>
<td><strong>Acidification potential (AP)</strong></td>
<td>mol H⁺ eq.</td>
<td>1.39E-02</td>
<td>2.17E+00</td>
<td>2.31E-01</td>
</tr>
<tr>
<td><strong>Eutrophication potential (EP)</strong></td>
<td>kg P eq.</td>
<td>5.91E-02</td>
<td>1.89E-02</td>
<td>7.79E-02</td>
</tr>
<tr>
<td>Aquatic freshwater</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic marine</td>
<td>kg N eq.</td>
<td>5.14E-03</td>
<td>0.00E-01</td>
<td>5.14E-03</td>
</tr>
<tr>
<td>Aquatic terrestrial</td>
<td>mol N eq.</td>
<td>2.22E+00</td>
<td>2.47E-01</td>
<td>2.47E+00</td>
</tr>
<tr>
<td><strong>Photochemical oxidant creation potential (POCP)</strong></td>
<td>kg NMVOC eq.</td>
<td>1.03E-02</td>
<td>1.21E-02</td>
<td>2.24E-02</td>
</tr>
<tr>
<td><strong>Abiotic depletion potential (ADP)</strong>*</td>
<td>kg Sb eq.</td>
<td>2.44E-05</td>
<td>0.00E+00</td>
<td>2.44E-05</td>
</tr>
<tr>
<td>Fossil resources</td>
<td>MJ, net calorific value</td>
<td>3.07E+01</td>
<td>0.00E+00</td>
<td>3.07E+01</td>
</tr>
<tr>
<td><strong>Water deprivation potential (WDP)</strong>*</td>
<td>m³ world eq. deprived</td>
<td>2.21E+00</td>
<td>0.00E+00</td>
<td>2.21E+00</td>
</tr>
</tbody>
</table>

*Verify by: [INTA](#) [INTI](#)*
Environmental Performance Indicators (2/3)

Percentage distribution of contributions to the Global Warming Potential (GWP) indicator

Carbon Footprint of 1kg beef meat LW

- Enteric fermentation CH; 80.8%
- Effluent management and others emissions; 4.5%
- Feed; 14.1%
- Water; 0.6%
## Environmental Performance Indicators (3/3)

### Comparison Environmental Results

*Between 1kg of live weight and 1kg of boneless meat (declared unit).*

<table>
<thead>
<tr>
<th>IMPACT INDICATORS</th>
<th>kg Live Weight</th>
<th>1 kg bonless meat</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLOBAL WARNING POTENTIAL (GWP) Totals</td>
<td>kg CO₂ eq.</td>
<td>1.22+01</td>
</tr>
<tr>
<td>OZONE LAYER DEPLETION (ODP)</td>
<td>kg CFC 11 eq.</td>
<td>9.07E-02</td>
</tr>
<tr>
<td>ACIDIFICATION POTENTIAL (AP)</td>
<td>mol H⁺ eq.</td>
<td>3.06E-02</td>
</tr>
<tr>
<td>EUTROPHICATION POTENTIAL (EP) Aquatic freshwater</td>
<td>kg P eq.</td>
<td>2.02E-03</td>
</tr>
<tr>
<td>EUTROPHICATION POTENTIAL (EP) Aquatic marine</td>
<td>kg N eq.</td>
<td>9.68E-01</td>
</tr>
<tr>
<td>EUTROPHICATION POTENTIAL (EP) Aquatic terrestrial</td>
<td>mol N eq.</td>
<td>8.81E-03</td>
</tr>
<tr>
<td>PHOTOCHEMICAL OXIDANT CREATION POTENTIAL (EP)</td>
<td>kg NMVOC eq.</td>
<td>1.04E-07</td>
</tr>
<tr>
<td>ABIOTIC DEPLETION POTENTIAL (ADP) Metals and minerals</td>
<td>kg Sb eq.</td>
<td>9.58E-06</td>
</tr>
<tr>
<td>ABIOTIC DEPLETION POTENTIAL (ADP) Fossil resources</td>
<td>MJ, net calorific value</td>
<td>1.21E+01</td>
</tr>
<tr>
<td>WATER DEPRIVATION POTENTIAL (WDP)</td>
<td>m³ world eq. deprived</td>
<td>8.68E-01</td>
</tr>
</tbody>
</table>
Use of Resource

Indicators of fresh, boneless, bovine meat produced by San Esteban S.A.

Declared Unit: 1 kg of packaged boneless meat, European breed.

<table>
<thead>
<tr>
<th>IMPACT INDICATORS</th>
<th>UNIT</th>
<th>Feed production</th>
<th>Animal breeding</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary energy resources</td>
<td></td>
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<tr>
<td>Renewable</td>
<td>Use as energy carrier</td>
<td>1.04E+00</td>
<td>0.00E+00</td>
<td>1.04E+00</td>
</tr>
<tr>
<td></td>
<td>Use as raw materials</td>
<td>4.40E+00</td>
<td>0.00E+00</td>
<td>4.40E+00</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>5.44E+00</td>
<td>0.00E+00</td>
<td>5.44E+00</td>
</tr>
<tr>
<td>Primary energy resources</td>
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<tr>
<td>Non-renewable</td>
<td>Use as energy carrier</td>
<td>0.00E+00</td>
<td>0.00E+00</td>
<td>0.00E+00</td>
</tr>
<tr>
<td></td>
<td>Use as raw materials</td>
<td>1.99E-01</td>
<td>0.00E+00</td>
<td>1.99E-01</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>1.99E-01</td>
<td>0.00E+00</td>
<td>1.99E-01</td>
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</tbody>
</table>
For the parameter **Global warming potential (GWP)**, a sensitivity analysis of the results, including **carbon sequestration** due to improved grassland management results in a total reduction of **-14.01 kg CO₂ eq**, for each kilogram of live-weight animals produced by San Esteban.

<table>
<thead>
<tr>
<th>Crop/Pasture</th>
<th>Natural grassland</th>
<th>Sown grassland (Mix)</th>
<th>Sown grassland (Alfa Alfa)</th>
<th>Corn Silage</th>
<th>Sorgum Silage</th>
<th>Corn Grain</th>
<th>Soybeans</th>
<th>Intercalary grasses (summer) sorgum</th>
<th>Intercalary grasses (winter) ray grass</th>
<th>Intercalary grasses (winter) oat</th>
<th>Total removal (t CO₂ eq)</th>
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<tbody>
<tr>
<td><strong>Farm</strong></td>
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<tr>
<td>San Esteban</td>
<td>Entre Ríos</td>
<td>Entre Ríos</td>
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<td>2023</td>
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<tr>
<td><strong>Production Dry Matter kg/ha</strong></td>
<td>2620</td>
<td>7000</td>
<td>6000</td>
<td>9000</td>
<td>9000</td>
<td>6500</td>
<td>2500</td>
<td>10.000</td>
<td>6.000</td>
<td>7.000</td>
<td></td>
</tr>
</tbody>
</table>

**Calculation**

<table>
<thead>
<tr>
<th>Carbon existence Initial t C/ha</th>
<th>76.87</th>
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</thead>
<tbody>
<tr>
<td>Land use factor FLU</td>
<td>1.00</td>
<td>1.00</td>
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<td>1.00</td>
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</tr>
<tr>
<td>Grassland/Natural area management Fmg</td>
<td>1.14</td>
<td>1.10</td>
<td>1.10</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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</tr>
<tr>
<td>Carbon inputs Fi</td>
<td>1.11</td>
<td>1.11</td>
<td>1.11</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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</tbody>
</table>

**Results**

| Final carbon stock calculationn t C/ha | 77.41 | 77.29 | 77.29 | 76.87 | 76.87 | 76.87 | 76.87 | 76.87 | 76.87 | 77.29 | 77.29 |       |
| Change in carbon stock in the soil t C/ha | 0.54  | 0.42  | 0.42  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.42  | 0.42  |       |
| Change in the existence of carbon in the atmosphere - t CO₂ eq/ha | 1.97  | 1.55  | 1.55  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 1.55  | 1.55  |       |

**Removal System**

| Surface ha | 2391 | 629 | 75 | 62 | 120 | 88 | 80 | 159 | 392 | 117 |       |
| Total annual removal t CO₂ eq | 4718.50 | 974.95 | 116.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 607.08 | 181.38 | 6598.35 |

Verify by: [INTA](https://www.inta.gob.ar) [INTI](https://www.inti.gov.ar)
Additional environmental performance indicators (2/2)

This value determines that the carbon footprint of the meat produced by San Esteban, considering the carbon removals according to Tier 1 of the IPCC methods, is reduced from **12.24 kg CO₂** equivalent per kg of live weight to **-1.77 kg CO₂** equivalent per kg of live weight.

- Furthermore, taking into account the yield and the allocation, the final value of the parameter Global warming potential (GWP) is **-4.51 kg CO₂ eq** for each kilogram of meat (declared unit).

### IMPACT INDICATORS 1 kg Live Weight

<table>
<thead>
<tr>
<th>IMPACT INDICATORS</th>
<th>1 kg Live Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL GWP</strong></td>
<td>12.24</td>
</tr>
<tr>
<td>Fossil</td>
<td>1.80E+00</td>
</tr>
<tr>
<td>LULUC</td>
<td>2.24E-03</td>
</tr>
<tr>
<td>Biogenic</td>
<td>1.05E+01</td>
</tr>
<tr>
<td>Enteric fermentation CH₄</td>
<td>0.00E+00</td>
</tr>
<tr>
<td>Effluent management and other emissions</td>
<td>0.00E+00</td>
</tr>
<tr>
<td>Feed</td>
<td>1.70E+00</td>
</tr>
<tr>
<td>Water</td>
<td>7.60E-02</td>
</tr>
<tr>
<td>Transportation</td>
<td>0.00E+00</td>
</tr>
</tbody>
</table>

### IMPACT INDICATORS 1 kg Bonless meat

<table>
<thead>
<tr>
<th>IMPACT INDICATORS</th>
<th>TOTAL</th>
<th>1 kg Bonless meat</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL GWP</strong></td>
<td>12.24</td>
<td>31.18</td>
</tr>
<tr>
<td>Total annual animal production kg</td>
<td>471.000</td>
<td>164.00</td>
</tr>
<tr>
<td>Total annual animal production kg/ha</td>
<td>130.67</td>
<td>45.50</td>
</tr>
<tr>
<td>Total annual carbon removal kg CO₂ eq</td>
<td>-6.598.355</td>
<td></td>
</tr>
<tr>
<td>Removal for 1 kg kg CO₂ eq</td>
<td>-14.01</td>
<td>-35.69</td>
</tr>
<tr>
<td>Balance GWP for 1kg kg CO₂ eq</td>
<td>-1.77</td>
<td>-4.51</td>
</tr>
</tbody>
</table>

**Contact**

For additional information relative to San Esteban S.A. activities or regarding this environmental declaration please contact:

**Paolo Fontana | sanesteban@gruposanesteban.com.ar**
Analysis of the Results

Global Warming Potential (GWP) of San Esteban S.A.

1 kg of bovine live weight (labelled of 1 kg of beef meat corresponds 2.701 kg of live weight).

Balance = -1.77 Kg CO2 eq 1 kg/PV

Verify by:

San Esteban S.A. | Argentine Meat
References

General Program Instructions of the International EPD® System. Version 4.0
CPC 2111, 2113.

Other References
General Program Instructions (GPI) of the International EPD® System, version 4.0
ISO 14025: 2006 Environmental labels and declarations -Type III environmental declarations -Principles and procedures.
PCR Meat of mammal’s product. Version 4.0.1 (24/10/22)