Proteins for the future
Differences in milk and plant protein

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Why?
Recently, the demand for plant-based milk alternatives have increased, mainly due to more focus on sustainability, lactose intolerance and diet selection. The most popular plant drinks are based on almond, rice, oat and soy.

- But how should we choose the sources of protein in the future? And what should we base the discussions on?

Climate impact
A comparison of milk and plant-based beverages shows that the CO₂ emission per liter beverage is significantly lower for plant-based beverages. However, the CO₂ emission per amount of protein is significantly lower for milk compared to plant-based beverages.

Further, plant drinks are often more processed products, based on different ingredients, imported to Denmark and heat treated. - Is this leading to a higher energy requirement?

Reference

Table showing nutritional content, DIAAS values, environmental influence and prices of bovine milk and plant-based milk alternatives

<table>
<thead>
<tr>
<th></th>
<th>Energy</th>
<th>Fat</th>
<th>Protein</th>
<th>Carbohydrates</th>
<th>Calcium</th>
<th>DIAAS</th>
<th>CO₂ emission</th>
<th>CO₂ emission (kg/kg protein)</th>
<th>Water consumption</th>
<th>Price in Denmark</th>
<th>Protein price</th>
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</thead>
<tbody>
<tr>
<td>Whole milk</td>
<td>120</td>
<td>4.8</td>
<td>3.6</td>
<td>4.8</td>
<td>120</td>
<td>1.18</td>
<td>1.2</td>
<td>36.6</td>
<td>1000</td>
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<td>326</td>
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<tr>
<td>Skimmed milk</td>
<td>124</td>
<td>4.8</td>
<td>3.6</td>
<td>4.8</td>
<td>124</td>
<td>1.18</td>
<td>1.2</td>
<td>36.6</td>
<td>1000</td>
<td>9</td>
<td>265</td>
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<tr>
<td>Soy</td>
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<td>2.1</td>
<td>3.7</td>
<td>1.1</td>
<td>10</td>
<td>0.10</td>
<td>0.35</td>
<td>9.5</td>
<td>300</td>
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</table>

Greenhouse gas

Protein quality
The Food and Agriculture Organisation (FAO) has introduced a score, which gives an estimate on protein digestibility and amount of essential amino acids, called Digestible indispensable amino acid score (DIAAS). In a comparison of dairy protein and selected plant protein sources, only the dairy proteins had a DIAAS ratio above 1.00, which is the criteria for an excellent protein source. Further, the higher degree of processing of most of the plant drinks may lead to more modifications of the proteins and potentially changes in protein quality.

Reference