COMPARATIVE ENVIRONMENTAL ANALYSIS OF FOOD PRODUCTS.

OBJECTIVE/BUSINESS QUESTIONS

* Which products contribute the highest total emissions?
* How do animal based products compare to plant based products in terms of emission.
* Which food categories require the largest land area per kilogram?
* Is there a noticeable difference in land use between animal-based and plant-based products?
* Which life cycle stage (processing, packaging, retail, and transport) contributes the most to total emissions?
* How do product categories rank when comparing emissions, land use and water**?**
* Which food categories require the **largest land area per kilogram**?

METHODOLOGY.

The dataset consisted of 43 food product with 23 columns. Data was cleaned and missing values were handled.

TOOL USED:

Power BI was the tool used. It was used due to its dynamic nature to show interactive dashboards and

INSIGHTS GENERATED

Question 1:

From the analysis, it is seen that beef has the highest total emissions. Also, the analysis indicates that Animal products produces the highest emissions. A visual depicting the top 10 food products with the highest emissions had 7 animal products being a majority of the 10.

Question 2:

When comparing animal-based vs plant-based products, animal-based foods contribute significantly higher emissions, land use, and water consumption. For instance, animal-based products generated approximately 22.6K units of total emissions, compared to just 17.5K units for plant-based products. In terms of water, animal products also consume far more resources, highlighting the environmental burden of livestock production.

Question 3:

In terms of land area required per kilogram, beef products dominate. Beef (herd) requires the largest land use, far exceeding most plant-based alternatives. Lamb and mutton also follow closely, confirming that red meat is among the least sustainable in terms of land intensity. Plant-based categories such as rice and soy milk require much less land per kilogram.

Question 4:

There is indeed a noticeable difference in land use between animal and plant categories. The visuals indicate that animal-based products account for 0.9K units of land use, compared to just 0.2K for plant-based products. This stark difference emphasizes the environmental advantage of plant-based diets.

Question 5:

Looking at life cycle emissions (processing, packaging, retail, and transport), processing contributes the largest share of emissions across many food products. For example, beef (herd) alone records 1.3 units of processing emissions, significantly higher than most plant-based categories, which remain below 0.2 units. This suggests that industrial processing in animal agriculture is a critical hotspot for emissions reduction.

Question 6:

When comparing food categories across emissions, land use, and water, the ranking becomes clear:

* Highest impact: Beef (herd), Lamb & Mutton, Cheese
* Moderate impact: Coffee, Dark Chocolate, Shrimp (farmed)
* Lowest impact: Plant-based products such as rice, soy milk, and bread.

These findings reinforce that adopting more plant-based diets could significantly lower the environmental footprint.

Recommendations

1. Promote Plant-Based Alternatives

Encourage a gradual dietary shift toward plant-based foods such as rice, soy milk, and bread, which have consistently lower emissions, land use, and water requirements compared to animal-based products.

1. Target High-Impact Products

Focus reduction strategies on beef, lamb, and cheese, which dominate emissions and land use. Businesses and policymakers could prioritize taxes, regulations, or awareness campaigns around these products.

1. Optimize Processing Efficiency

Since processing contributes the highest life cycle emissions, investment in cleaner processing technologies, renewable energy, and efficiency improvements should be prioritized.

1. Sustainable Water and Land Management

For animal-based supply chains, adopt better land-use practices (e.g., rotational grazing, agroforestry) and water-efficient farming methods to reduce the environmental strain.

1. Consumer Awareness Campaigns

Educate consumers on the environmental footprint of their food choices. Transparency (e.g., carbon labels on products) can guide purchasing decisions toward more sustainable products.

1. Innovation in Packaging & Transport

Although these contribute less compared to processing, sustainable packaging innovations and optimized transport logistics can further reduce the overall footprint.

Conclusion

The comparative analysis clearly shows that animal-based products—especially beef, lamb, and cheese—are the largest contributors to greenhouse gas emissions, land use, and water consumption. Plant-based foods, on the other hand, demonstrate much lower environmental impacts, making them essential for any sustainability strategy.

By focusing on reducing reliance on high-impact animal products, improving efficiency in food processing, and promoting plant-based alternatives, significant environmental benefits can be achieved. This not only aligns with global climate goals but also offers businesses opportunities to lead in sustainability, reduce costs, and meet the growing demand for eco-conscious food options.

Ultimately, dietary shifts, technological innovations, and awareness initiatives represent powerful levers to reduce the environmental footprint of food systems and foster a more sustainable future.