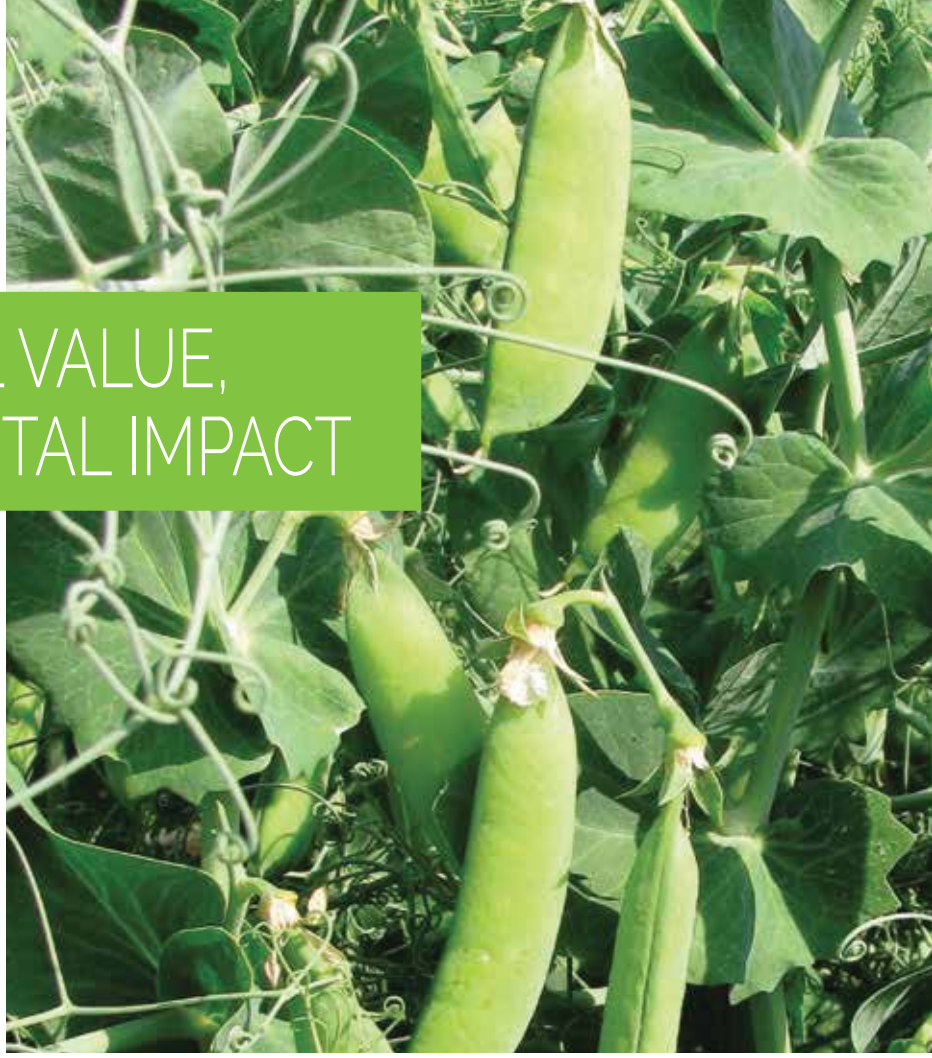
ALBERTA PEAS

A WIN-WIN CROP

HIGH NUTRITIONAL VALUE, LOW ENVIRONMENTAL IMPACT



"Peas are a low carbon source of plant based protein, rich in fibre, vitamins and minerals."

Public awareness of the environmental impacts of food production systems and food choices is increasing. Consumers want to know more about how their food is being produced, and how their food choices impact their health and the environment.

In a recent survey, Canadian consumers indicated a willingness to pay a premium price for certain product attributes, such as nutritional value and environmental sustainability. Peas, a pulse crop, are recognized as a good source of protein and as a major component of the Canadian Food Guide's meat-alternative food.

To gain a comprehensive understanding of sustainability performance, the Alberta Pulse Growers (APG) and, Alberta Agriculture and Forestry (AAF) are collaborating on measuring the environmental footprint of Alberta peas using a method called life cycle assessment (LCA). A study exploring the combined health and environmental benefits of pulses is included in this work.

"This study contributes to the good news story of pulses for producers and consumers," said Debra McLennan, APG's Food and Nutrition Coordinator. "Now people can contribute to their good health and the environment by lowering their carbon footprint with inexpensive, nutrient dense pulses grown right here in Alberta."

Quantifying the carbon footprint and nutritional values of protein rich foods

To measure the environmental footprint of Alberta peas, carbon was selected as the impact indicator for the study because it is the most widely used international environmental impact indicator for life cycle assessment of consumer products. Carbon footprints of other protein rich foods were calculated from a number of Canadian studies on life cycle assessment that reported and included protein values.

Both protein and energy were selected for the study because both are essential to the human body for growth and development. The carbon footprint of the protein rich foods were assessed based on mass (kg), protein (100 g) and energy (1,000 kcal). In addition, the carbon footprint of the foods was examined based on one serving. Nutritional information (protein and energy) on the protein rich foods were collected from the USDA Food Composition Database. Serving size information on the foods was collected from Eating Well with Canada's Food Guide®.

Carbon footprint of protein rich foods

Figure 1 illustrates the carbon footprints of various protein rich foods based on mass (kg) and nutritional value (100 g of protein and 1,000 kcal). The carbon footprint values

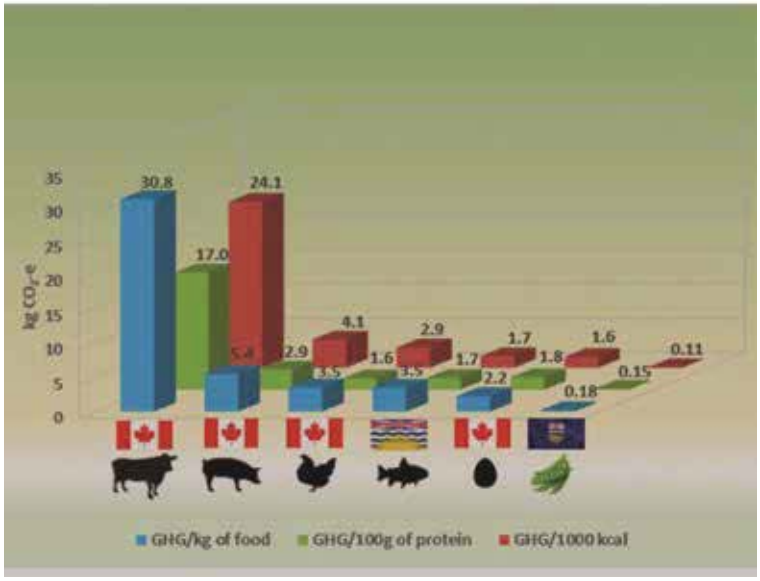


Figure 1. *Carbon footprint (GHG) of protein rich foods based on mass, protein and energy.*

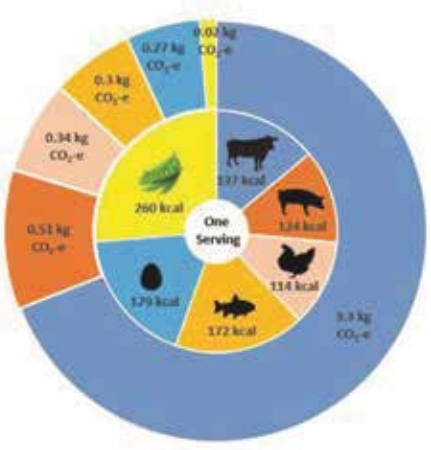


Figure 3. *Amount of energy and the associated carbon footprint of one serving of six protein rich foods.*

are expressed as carbon dioxide equivalents (CO_2-e) which include all greenhouse gas emissions in a common unit. Carbon footprints of all of the animal-based proteins reported were found to be greater than the carbon footprint of Alberta peas. The main reasons for animal based proteins having a higher carbon footprint is due to the production of feed, enteric emissions from ruminant animals, and emissions to air, water and soil from manure management and application.

Feed conversion efficiencies of animal production has an important influence on the intensity of the carbon footprint. Generally, beef has a feed conversion rate of 6.5 which is the highest ratio, followed by pork (4.5), egg (2.0), chicken (1.8) and salmon (1.0). The higher the ratio, the more likely the animal protein source will have a larger carbon footprint. Ruminant animals emit enteric methane gas which is 28 times more potent than carbon dioxide, resulting in a larger carbon footprint. Conversely, peas had the lowest carbon footprint because pulses fix nearly all the nitrogen required for their growth. The lower nitrogen fertilizer required for pea production reduces nitrous oxide emissions which is 265 times more potent than carbon dioxide. In addition, the adoption of no-till cropping reduces the fossil fuel consumption for pea production.

Carbon footprints and nutritional values of one serving of protein rich foods

The carbon footprint and protein value of one serving of various protein rich foods is illustrated in Figure 2. One serving of peas provides 18 g of protein which accounts for about 36 per cent of average daily protein requirement (assuming 50 g/person/day). One serving of peas provides the same value of protein as one serving of pork and eggs. One serving of beef provides the highest value of protein, followed by chicken. One serving of beef contributes the highest carbon footprint, followed by pork, chicken, fish, eggs and peas which has the lowest carbon footprint.

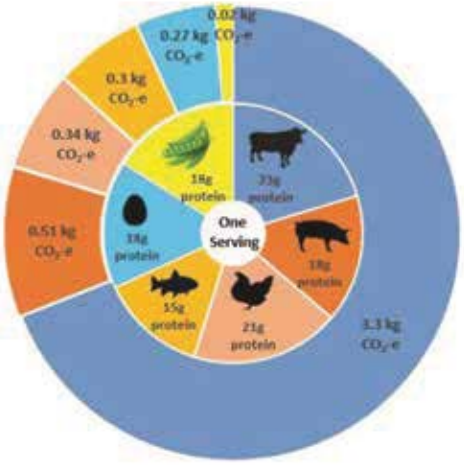
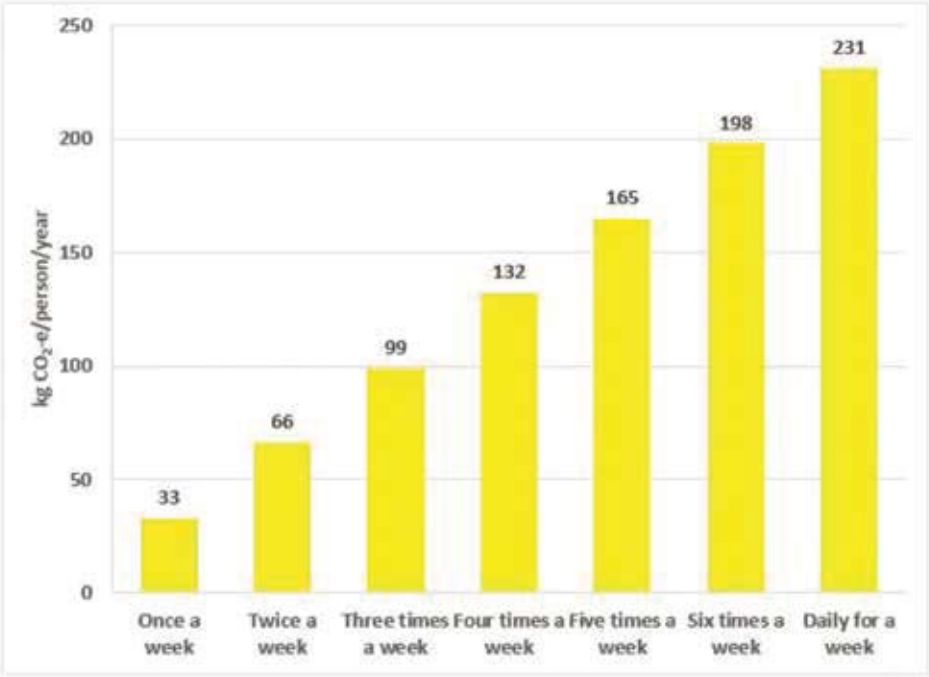


Figure 2. *Amount of protein and the associated carbon footprint of one serving of six protein rich foods.*

Figure 3 illustrates the carbon footprint and energy value of one serving of protein rich foods. One serving of peas provides the highest value of energy, followed by egg, fish, beef, pork and chicken. One serving of peas provides 260 kcal which accounts for about 13 per cent of the average daily energy requirement (assuming 2,000 kcal/person/day). Similar to the previous chart, one serving of beef contributes the highest carbon footprint, followed by pork, chicken, fish, eggs and peas which has the lowest carbon footprint. Overall, peas provide a significant proportion of our body's daily nutrient requirement, with a considerably smaller carbon footprint.

"Peas are a low carbon source of plant based protein, rich in fibre, vitamins and minerals," said Aung Moe, AAF's Environmental Footprint Agrologist and certified LCA professional. "They are highly recommended to include in a daily diet by national dietary guidelines."



Equivalent	Once a week	Twice a week	Three times a week	Four times a week	Five times a week	Six times a week	Daily
Litres of gasoline:	14	27	41	55	69	82	96
Days of using refrigerator:	22	44	66	87	109	131	153
kWh of electricity:	36	72	108	143	179	215	251

Figure 4. *Annual savings in carbon footprint when the average diet in a week is replaced with the caloric equivalent of one serving of peas/day basis.*

According to another recent study of carbon footprints of dietary choices in Ontario, daily food consumption for an average person contributed a carbon footprint of 5.77 kg CO_2-e/person/day, providing 2,294 kcal/day of energy. This means a calorie contributes to 2.52 g CO_2-e. A serving of peas provides 260 kcal. If we replace the average diet with the caloric equivalent of a serving of peas once a week, you will keep 33 kg CO_2-e out of the atmosphere annually. The more frequently we include a serving of peas in our meals, the more greenhouse gases (GHG) will be kept out of the atmosphere. Daily consumption of a serving of peas will help reduce 231 kg CO_2-e annually (Figure 4).

How much is 231 kg CO_2-e? It is equivalent to not burning 96 litres of gasoline, or not using 153 days of your average household refrigerator, or not using 251 kWh of household electricity. Inclusion of peas in our daily meals is a big win for the environment.

"Peas, a major crop grown in Alberta, can provide a significant proportion of our bodies' daily nutritional needs and has a low carbon footprint."

Highly-Nutritious and Low-Impact Protein Rich Food

Pulses play a major role in plant-based protein sources for human consumption. Pulses, which include peas, beans and lentils, are highly endorsed as a healthy, balanced and sustainable diet. They are widely regarded by the World Health Organization (WHO) as an essential component to be included in human diets for the prevention of non-communicable diseases such as heart disease, stroke and Type 2 diabetes.

A number of national dietary guidelines including Canada's Food Guide and the USDA's MyPlate® recommend that pulses be part of a healthy, balanced and sustainable diet as a source of plant-based protein and dietary fibre. The APG and AAF footprinting study confirms peas, which is a major crop grown in Alberta, can provide a significant proportion of our bodies' daily nutritional needs and has a low carbon footprint. What does this mean to a person looking for a tasty and healthy protein rich food? Eating peas is "good for you and the environment".

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