Traditional African Diet versus Westernized Diet.
Chart 1: The Number of People with Chronic Conditions is Rapidly Increasing


The Growing Global Chronic Disease Epidemic  D'Vera Cohn

Yet diabetes, cancer, cardiovascular disease, and other chronic conditions account for most deaths in rich, middle-income and lower middle-income countries, surpassing infectious diseases, malnutrition, and deaths of new mothers and babies combined. In low-income countries, they account for 40 percent of deaths, but are predicted to become the cause of more than half of all deaths.

Speakers at a recent PRB symposium explained that chronic diseases also are a drain on national economies and family incomes, so their spread will make it harder to win the global fight against poverty. The symposium, held on April 30 in Washington, D.C., highlighted recent research about how diet and lifestyle changes can lower the risk of chronic disease. But current trends run counter to recommendations supported by this research: People in developing countries are adopting unhealthy behaviors practiced in developed nations.

View Webcast of PRB Symposium: Confronting Chronic Diseases: Are We Prepared?

World Breast and Prostate cancer rates. (WHO and Am. Cancer Soc.)
Cancer mortality in the USA

**Age-adjusted cancer death rates, 1987-1991**
Animal Protein and Lymph Gland Cancer

Per capita bovine protein consumption (g/day)

Lymphoma deaths/100,000 of population/yr

- Japan
- France
- Yugoslavia
- Belgium
- Netherlands
- United Kingdom
- Finland
- Switzerland
- Denmark
- Canada
- New Zealand
- USA

[Graph showing correlation between per capita bovine protein consumption and lymphoma deaths]
Dietary Fat and Breast Cancer Deaths

Death rate per 100,000

Total dietary fat intake (g/day) 1944-66

FEMALE

Malta

Australia

Canada

Sweden

U.S.A.

W. Germany

France

Finland

Poland

Greece

Hong Kong

Mexico

Japan

Thailand

Venezuela

Portugal

Japan
Milk and Breast Cancer

Death rates / 100,000 women

% With lactase sufficiency in adulthood

Edamame Nutrition
Edamame is a rich source of carbohydrates, proteins, dietary fiber, omega fatty acids and several vitamins and minerals. About 155 gm of prepared edamame contains approximately 16 gm of carbohydrate, 17 gm proteins, 8 gm fats and 8 gm dietary fiber.

The same quantity of edamame also contains around 9.5 mg of vitamin C, 41.4 mcg of vitamin K, 0.3 mg thiamine (vitamin B1), 0.2 mg riboflavin (vitamin B2), 1.4 mg niacin (vitamin B3), 0.6 mg pantothenic acid (vitamin B5), 97.6 mg of calcium, 3.5 mg iron, 99.2 mg magnesium, 676 mg potassium, 262 mg phosphorus, 2.1 mg zinc and 1.6 mg manganese. Apart from these, 155 mg of edamame contains about 560 mg of omega-3 essential fatty acids and 2781 mg of omega-6 fatty acids.
Prostate cancer death rates

Countries with phytoestrogen-rich diet

Countries with phytoestrogen-deficient diet

Number of deaths per 100,000 men

China
South Korea
Japan
UK
Australia
USA
Eat to live
by
Sue Radd
and
Dr Kenneth Setchell
Twenty years ago nobody had heard of phytoestrogens… What intrigued us in the late 1970s, however, was our discovery that if soy foods or linseeds are eaten the concentrations of phytoestrogens in the blood soar. We then went on to show that people who regularly eat these foods, like Asians and vegetarians, have huge levels of phytoestrogens in their body – and guess what?
These people do not suffer the ravages of the common diseases that kill most Westerners. In two landmark scientific publications in 1980 and 1984, we proposed that phytoestrogens offered the clue to healthy living,…

Foreword p.xii
Health benefits for:

- Breast cancer
- Prostate and other cancers
- Heart disease and stroke
- Osteoporosis
- Menopausal symptoms
- Brain diseases linked with ageing
- Alcoholism
- Inflammatory diseases such as rheumatoid arthritis
What are phytoestrogens?

Phytoestrogens are natural plant molecules, similar in shape and size to the human body’s estrogen, but not identical. This slight difference means they don’t have all the same effects as estrogens – luckily, since some of the effects of estrogen can be nasty.
Controlling cancer enzymes

Phytoestrogens inhibit the actions of enzymes that cause tumour cells to multiply.

…genistein, the phytoestrogen found in soy, potently inhibits enzymes called protein tyrosine kinases that regulate the way many growth factors work in cells. …The same enzymes are involved in inflammation..
Inflammation plays a central role in many other conditions, such as heart disease, rheumatoid arthritis, psoriasis and inflammatory bowel disease. Several studies have now found that phytoestrogens are anti-inflammatory and may therefore have a positive effect on such conditions.
Phytoestrogen-rich diet

- Improves blood vessel elasticity
- Prevents blood clotting
- Reduces plaque formation in blood vessels
- Reduces blood cholesterol
- Heart disease and stroke
- Inflammation
- Diabetes and kidney disease

Benefits:
- Reduces blood cholesterol
- Prevents blood clotting
- Improves blood vessel elasticity

Diseases:
- Dementia
- Alzheimer’s disease
- Cognition
- Immune system
- Alcoholism
- Prostate cancers
- Colon
- Breast
- Leukaemia
- Skin
- Osteoporosis
- Menopause symptoms
- Endometriosis
- Hot flushes

Conditions:
- Diabetes and kidney disease
- Heart disease and stroke
- Reduces blood cholesterol
- Improves blood vessel elasticity
- Prevents blood clotting
- Reduces plaque formation in blood vessels
- Inflammation
- Menopause symptoms
- Endometriosis
- Hot flushes
PLANT PROTEINS - ANIMAL PROTEINS?
How the Myth Began

• 1914, Osborne and Mendel found that rats grew better on animal protein
• 1945, ten amino acids found to be necessary for a rat’s diet
• Animal protein was found to guarantee normal growth in a rat
• Animal protein called “Class A” and vegetable protein called “Class B”
# Protein Comparison of Milk in Different Species

<table>
<thead>
<tr>
<th>Species</th>
<th>Mean values for protein content, mg/liter</th>
<th>Time required to double birth weight (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human</td>
<td>1.2</td>
<td>120</td>
</tr>
<tr>
<td>Horse</td>
<td>2.4</td>
<td>60</td>
</tr>
<tr>
<td>Cow</td>
<td>3.3</td>
<td>47</td>
</tr>
<tr>
<td>Goat</td>
<td>4.1</td>
<td>19</td>
</tr>
<tr>
<td>Dog</td>
<td>7.1</td>
<td>8</td>
</tr>
<tr>
<td>Cat</td>
<td>9.5</td>
<td>7</td>
</tr>
<tr>
<td>Rat</td>
<td>11.8</td>
<td>4.5</td>
</tr>
</tbody>
</table>
Total Vegetarian Diet Provides The Best Protein Quality

<table>
<thead>
<tr>
<th>Type of Diet</th>
<th>Percent variance from Rose's standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>pure-vegetarian</td>
<td>28%</td>
</tr>
<tr>
<td>non-vegetarian</td>
<td>48%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percent variance from human breast milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>pure-vegetarian</td>
</tr>
<tr>
<td>non-vegetarian</td>
</tr>
</tbody>
</table>
UK shoppers give pork the chop after processed meats linked to cancer

Sales of bacon and sausages fell by £3m in two weeks since WHO claimed processed meats were a major cause of cancer.
Food industry greets cancer links with a shrug - it's been here before

Graham Ruddick

History suggests food shoppers only change eating habits in short-term, hence muted reaction from food firms at processed meat and cancer links

Supermarkets and food suppliers, already under fierce pressure over the amount of sugar in the nation’s food, could have done without more revelations about the health consequences of the food we eat.

But after a lengthy investigation by its International Agency for Research on Cancer, the World Health Organisation has concluded that bacon, ham and sausages are carcinogenic.

Sausage manufacturing at Cranswick in Kingston upon Hull: shares in the pork manufacturer dropped by just 0.4%. Photograph: David Sillitoe for the Guardian
COMPLETE AND INCOMPLETE PROTEINS
Plant proteins contain more branched chain amino acids than do animal proteins and they are easier to digest than animal proteins. Animal proteins are rich in the sulphur-containing amino acids cysteine and methionine, and also have a greater proportion of the aromatic amino acids phenylalanine and tyrosine. Excesses of these two groups of amino acids have been associated with various degenerative diseases.
Plant proteins produce higher levels of *arginine* and *glycine* in the blood than do animal proteins and the higher levels of these amino acids is associated with protection against the clogging of arteries and arteriosclerosis. *Sanches, A., Horning, M.C., Wingeleth, D.C.* 1983. *Plasma amino acids in humans fed plant proteins.* *Nutrition Reports International.* 28:3.

Phenols have been implicated as promoters of bowel cancer and ammonia increases cell proliferation and has also been linked to colon cancer. *Bingham, S.A. 1996. Epidemiology and mechanisms relating diet to risk of colorectal cancer. Nutrition Research Reviews. 9:197-239.*
SUMMARY

ARGININE AND GLYCINE SHOULD BE HIGH.

THERE SHOULD BE ENOUGH LYSINE.
PROTEINS: HOW MUCH?
Safe levels of protein intake as proposed by the FAO/WHO/UNU. Values are uncorrected for the nutritional value of the protein.

<table>
<thead>
<tr>
<th>Age group</th>
<th>male</th>
<th>female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>g/Kg/day</td>
<td>g/Kg/day</td>
</tr>
<tr>
<td>3-6 months</td>
<td>1.85</td>
<td>1.85</td>
</tr>
<tr>
<td>6-9 months</td>
<td>1.65</td>
<td>1.65</td>
</tr>
<tr>
<td>9-12 months</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>1-2 years</td>
<td>1.20</td>
<td>1.20</td>
</tr>
<tr>
<td>2-3 years</td>
<td>1.15</td>
<td>1.15</td>
</tr>
<tr>
<td>3-5 years</td>
<td>1.10</td>
<td>1.10</td>
</tr>
<tr>
<td>5-7 years</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>7-10 years</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>10-12 years</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>12-14 years</td>
<td>1.00</td>
<td>0.95</td>
</tr>
<tr>
<td>14-16 years</td>
<td>0.94</td>
<td>0.90</td>
</tr>
<tr>
<td>16-18 years</td>
<td>0.88</td>
<td>0.80</td>
</tr>
<tr>
<td>Adults</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>During pregnancy</td>
<td>Add 6.0g to total</td>
<td></td>
</tr>
<tr>
<td>Lactation: 0-6 months</td>
<td>Add 17.5g to total</td>
<td></td>
</tr>
<tr>
<td>&quot; older than 6 months</td>
<td>Add 13.0g to total</td>
<td></td>
</tr>
</tbody>
</table>
Dietary protein increases production of acid (in the blood) which can be neutralized by calcium mobilized from skeleton. *American Journal of Clinical Nutrition* 1995; 61 (4):909

About 50,000 Americans die each year of problems related in some way to osteoporosis. *Osteoporosis International* 1993; 3 (3): 148-153
Even when eating 1,400mg of calcium daily, one can lose up to 4% of his or her bone mass each year while consuming a high-protein diet. American Journal of Clinical Nutrition 1979; 32 (4): 741-749

Under controlled conditions the level of dietary protein has a profound and sustained effect on urinary calcium (levels)... Federation Proceedings 1981; 40(9): 2429-2433
Relationship Between Calcium Intake and Hip Fracture Rate

<table>
<thead>
<tr>
<th>Calcium Intake (mg/day approx.)</th>
<th>Hip-fracture Rate (per 100,000 people)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>75</td>
<td>200</td>
</tr>
<tr>
<td>50</td>
<td>400</td>
</tr>
<tr>
<td>25</td>
<td>600</td>
</tr>
<tr>
<td>125</td>
<td>800</td>
</tr>
<tr>
<td>150</td>
<td>1000</td>
</tr>
<tr>
<td>175</td>
<td>1200</td>
</tr>
<tr>
<td>200</td>
<td>1400</td>
</tr>
</tbody>
</table>

Countries: South Africa, Hong Kong, Singapore, Yugoslavia, New Guinea, Spain, Israel, Denmark, United States, United Kingdom, Holland, Finland, New Zealand, Norway, Sweden, Ireland, Finland, United States, United Kingdom, Holland, Denmark, New Zealand, Norway, Sweden, Ireland, Finland, United States, United Kingdom, Holland, Denmark, New Zealand, Norway, Sweden, Ireland, Finland, United States, United Kingdom, Holland, Denmark, New Zealand, Norway, Sweden, Ireland, Finland.
A high ratio of dietary animal to vegetable protein increases the rate of bone loss and the risk of fracture in postmenopausal women. Selmeyer et al. 2001. AJCN 73 (1):118-122

“Women in the highest quintile of ratio of animal to vegetable protein intake (>3.17) had nearly 4 - fold greater risk of fracture compared with women with low ratios, independent of other risk factors, including age, calcium intake, weight, estrogen use, smoking status, alcohol use and total protein intake.”
PRIMATE UNIT
Osteoporosis

Normal vertebrae  After Maceration

Osteoporotic vertebrae  After Maceration
Urinary and stool parameters taken over a 24 hour period for monkeys on milk and maize-legume diets

![Graph showing Urine Production (ml/24hr) over Time (Weeks) for monkeys on milk and maize-legume diets. The graph compares urine production between milk solids and maize-legume diets. There is a significant difference (P<0.002) in urine production between the two diets.]

- **Maize-legume**
- **Milk solids**

Urine production of monkeys on milk and maize-legume diets

- P<0.002
Urinary and stool parameters taken over a 24 hour period for monkeys on milk and maize-legume diets

Stool production of monkeys on maize-legume and milk diets

Maize-legume

Milk solids

P<0.001
Urinary calcium excretion in monkeys on Maize legume and milk diets
Current Dogma

↑ Protein consumption
↓ Urinary Ca loss
↓ Negative Ca balance
↓ Bone mass
↓ Fractures and deformities
Methods

• Fifty S.A. mutton merino rams

• (100 ≥ 12 days old and weighing 28 ≤ 3kg)

• Five groups:

  12% protein (Basic diet - Plant)
  15% protein (Basic + 3% Animal)
  17% protein (Basic + 5% Animal)
  20% protein (Basic + 8% Animal)
  20% protein (Basic + 8% Plant)
Fig. 14: The effect of protein rations on the degree of limb skewness.

* Significantly different from control ($P \leq 0.05$)
Bone Calcium : Phosphate

Cannon (r = -0.99; P = 0.2)
Rib (r = -0.51; P < 0.1)
Vert (r = -0.74; P < 0.05)

Dietary protein

Bone Cal: P (mg/cm³)
Ca loss (Urine and Stool) vs Cannon BMD (g/cm$^3$)

**Ca : P (mg/cm$^3$)**

- **Animal**
  - Ca loss: 500 mg/day
  - Ca : P: 1.00

- **Plant**
  - Ca loss: 52 mg/day
  - Ca : P: 1.65

**Deformity**

- **Animal**
  - Deformity: 62

- **Plant**
  - Deformity: 54
Coronary heart disease is fast becoming the leading killer in developing countries.

- Milk is implicated in:
  - Higher total cholesterol
  - Higher LDL
  - Lower HDL
TOTAL CHOLESTEROL IN THE PLASMA

CONCENTRATION (mmol/l)

TIME (DAYS)

P < 0.001

WESTERN

TRADITIONAL
LDL LEVELS IN PLASMA

P <0.001

CONCENTRATION (mmol/l)

TIME (DAYS)

BL 10 20 30 40

WESTERN TRADITIONAL
Serum HDL/LDL cholesterol ratios of monkeys on maize and milk diets.

![Graph showing serum HDL/LDL cholesterol ratios over time with maize and milk diets. The graph indicates a significant difference between the two diets with a P-value of 0.1.](image-url)
LYMPHOCYTE COUNT

P < 0.001

CONCENTRATION (%)

TIME (DAYS)

BL 10 20 30 40

WESTERN TRADITIONAL
PLATELET COUNT

NUMBER (x10^9/l)

TIME (DAYS)

BL 10 20 30 40

WESTERN TRADITIONAL

P<0.05
RED BLOOD CELL COUNT

P < 0.001
Plasma Arginine levels of rabbits fed an 18% protein ration derived from Soya and milk solids.
Plasma glycine levels of rabbits fed an 18% protein ration derived from Soya and milk solids.
# Arginine Content of Food

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Amount</th>
<th>Arg (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black walnuts</td>
<td>½ cup</td>
<td>2.3</td>
</tr>
<tr>
<td>Baby lima beans</td>
<td>1 cup</td>
<td>2.4</td>
</tr>
<tr>
<td>Red kidney beans</td>
<td>1 cup</td>
<td>2.6</td>
</tr>
<tr>
<td>Garbanzo beans/Chickpeas</td>
<td>1 cup</td>
<td>3.6</td>
</tr>
<tr>
<td>Lentils</td>
<td>1 cup</td>
<td>4.2</td>
</tr>
<tr>
<td>Soybeans</td>
<td>1 cup</td>
<td>5.3</td>
</tr>
<tr>
<td>Roasted pumpkin kernels</td>
<td>½ cup</td>
<td>6.2</td>
</tr>
</tbody>
</table>
Average urinary pH

Time in days

Casein

Soya

P ≤ 0.02

P ≤ 0.02
Mean faecal wet mass (g/day)

P ≤ 0.002

Casein

Soya
Total faecal calcium (mg/g)

- Casein
- Soya

P ≤ 0.05
Total urinary calcium loss (mg/day)

- Casein
- Soya

P ≤ 0.005
Urea production (mg ± SD/day)

- Casein
- Soya

P ≤ 0.005
Rabbits fed animal protein develop arteriosclerosis and have elevated cholesterol levels even if their diet is cholesterol free. If they are fed plant proteins, such as Soya, these effects are not observed and the plant protein source was shown to decrease the degree of sclerosis even in those animals that were fed cholesterol. Carroll, K.K. 1991. Review of the clinical studies on cholesterol-lowering response to soy protein. J.Am.Diet.Assoc. 91:820-827. Kritchevsky, D., Tepper, S.A., Klurfeld, D.M. 1987. Dietary protein and atherosclerosis. J.Am.Oil Chem.Soc. 64:1167-1171.

Plasma cholesterol levels of rabbits fed an 18% protein ration derived from Soya and milk solids.
Vegetable Protein Promotes Lower Cholesterol in Rabbits

![Graph showing average cholesterol levels for rabbits on plant-based protein (67 mg/dl) and animal-based protein (175 mg/dl).]
Ten Animal Proteins Cause High Cholesterol in Rabbits

- Egg Yoke Protein: 270 mg/dl
- Skim Milk Protein: 225 mg/dl
- Turkey Protein: 215 mg/dl
- Casein: 203 mg/dl
- Whole Egg Protein: 176 mg/dl
- Fish Protein: 160 mg/dl
- Beef Protein: 152 mg/dl
- Chicken Protein: 138 mg/dl
- Pork Protein: 107 mg/dl
- Raw Egg White: 101 mg/dl
- Ave. Plant Protein: 67 mg/dl

Blood Cholesterol Level, mg/dl
Ten Plant Proteins Cause Low Cholesterol in Rabbits

<table>
<thead>
<tr>
<th>Protein Type</th>
<th>Blood Cholesterol Level, mg/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ave. Animal Protein</td>
<td>175</td>
</tr>
<tr>
<td>Rapeseed Flour</td>
<td>96</td>
</tr>
<tr>
<td>Wheat Gluten</td>
<td>80</td>
</tr>
<tr>
<td>Peanut Protein</td>
<td>78</td>
</tr>
<tr>
<td>Oat Protein</td>
<td>76</td>
</tr>
<tr>
<td>Cottonseed Protein</td>
<td>75</td>
</tr>
<tr>
<td>Sesame Protein</td>
<td>63</td>
</tr>
<tr>
<td>Soy Protein Isolate</td>
<td>58</td>
</tr>
<tr>
<td>Sunflower Protein</td>
<td>51</td>
</tr>
<tr>
<td>Pea Protein</td>
<td>46</td>
</tr>
<tr>
<td>Faba Bean Protein</td>
<td>43</td>
</tr>
</tbody>
</table>

Blood Cholesterol Level, mg/dl
Milk and Infertility

From SCIENCE NEWS, 3/12/94.

Women who would like but have failed to conceive a child may want to review how big a role dairy products play in their diet, a new study suggest. A team of researchers in the United States and Finland now reports that where per capita milk consumption is highest, women tend to experience the sharpest age-related falloff in fertility.
TESTOSTERONE

![Bar graph showing testosterone levels over time for Western and Traditional diets.](image)

- **TIME (DAYS)**: BL-0, 50
- **Testos (NMOL/L)**: P > 0.05
- **WESTERN DIET**
- **TRADITIONAL DIET**
Progressive motility (%) vs. Time (days)

- Baseline: 0%
- Time (days): 60, 120
- High protein
- Low protein
- Milk

Grain-legume

P = 0.04
Sperm concentration (millions/ml)

Baseline

Time (days)

High Protein

Grain-legume

Milk

P < 0.04
Nature’s designer estrogens

...imbalances in estrogen are strongly linked to many major Western diseases, including heart disease and cancers such as prostate and breast cancer.

...excess estrogen can promote the growth of cancers...
The food we eat contains three main families of phytoestrogens: isoflavones, lignans and coumestans. Soybeans provide the richest source of isoflavones, while linseeds are super-rich in lignans. Coumestans, which are less abundant in the diet, can be found in alfalfa and other sprouts.
Estrogen impersonators and blockers
Phytoestrogens are similar ships that can dock at the same ports, but the signals they send out are weak.
Phytoestrogens are able to impersonate estrogens because of their similar molecular shape. However there are important differences in the way they work. Scientists have discovered that phytoestrogens are selective in their effects because they are fussier than estrogens about where and how they dock.
There are two types of estrogen receptors (docks) in the body. These are called alpha and beta. While estrogens normally dock to both of these receptors equally, given the choice phytoestrogens prefer the beta receptors. This is desirable since beta receptors are found in large numbers in the bone, brain and blood vessels – places where estrogen is known to have positive effects.
In certain parts of the body such as the breast and womb where there aren’t many beta receptors, phytoestrogens have to dock with the alpha receptors. In doing so this stops estrogens from docking and sending signals that could promote the growth of existing cancer.
In this situation phytoestrogens work as anti-estrogens and have a protective effect. Preventing estrogen from docking is the strategy used to stop breast cancer from recurring. That’s how the drug Tamoxifen works and it has been used for more than 30 years in about 80 per cent of women diagnosed with breast cancer.
by blocking the actions of estrogen …

phytoestrogens could also prevent the growth of breast cancer cells that did not have estrogen receptors. This indicated that phytoestrogens must also work in other ways to stop tumours from growing. Since these early studies, thousands of scientific publications have emerged showing that phytoestrogens have many other important properties not linked to hormone action that can regulate the way cells grow and multiply.
Urinary calcium excretion in monkeys on Maize legume and milk diets