Driving Sustainable Food Systems to Conserve Nature and Feed Humanity

Sandra Vijn
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WWF’s Mission and Vision

WWF's mission is to conserve nature and reduce the most pressing threats to the diversity of life on Earth.

Our vision is to build a future in which people live in harmony with nature.
What do pandas have to do with food?
We care about food because it affects biodiversity.

We care about biodiversity because we need it to produce food.
Food Production Impacts Land, Water, Oceans, Energy, and Climate

- exploits 85% of fisheries to limits or beyond
- uses 70% of fresh water
- uses 40% of land area
- uses 30% of global energy
- generates 20% of GHGs

We Consume More Resources than the Planet Can Renew

Source: Global Footprint Network
A planet under pressure

52%
Decline in Biodiversity since 1970
A planet under pressure: water

By 2025, at least 3.5 billion people will live in water-stressed river basins.

Source: Living Planet Report 2014. WWF in collaboration with Global Footprint Network, Water Footprint Network and ZSL Living Conservation
A planet under pressure: food

Over the next 40 years, we’ll need to produce as much food we have in the last 8,000 years of agriculture.

Source: Living Planet Report 2014. WWF in collaboration with Global Footprint Network, Water Footprint Network and ZSL Living Conservation
By 2050
double net food availability
We need to get better faster.
Climate Change Will Reduce Crop Yields

Projected Changes in Crop Yields, Due to Climate Change
Mostly Wheat, Maize, Rice and Soy

Source: IPCC Climate Change 2014 Synthesis Report Summary for Policymakers
Today’s Food-baskets May Not Be Tomorrow’s

Populations Will Grow Everywhere But Europe

Projected Population Growth Rate Compared to 2015

AFRICA
ASIA
EUROPE
Populations Will Grow Fastest Where Calorie Deficits are Greatest

Calorie Surpluses/Deficits from Global Average

Population Change, 2015 to 2030
World beef, pork and poultry consumption: 1980-2050

Sources: Global Insight Demand Analysis to 2050; Bauman and Capper (2011) Southwest Nutrition and Management Conference, Tempe, AZ
Dairy is very close to reach a gap in supply
Each year 7.2 BILLION PEOPLE CONSUME what the Earth’s natural resources can continue to provide.

Our quest to feed a growing global population is having a HUGE impact.

In short, our planet simply can’t replenish itself fast enough to meet expanding human needs.

Source: Living Planet Report 2014. WWF in collaboration with Global Footprint Network, Water Footprint Network and ZSL Living Conservation
How many Chinas does it take to support China?

<table>
<thead>
<tr>
<th>Country</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRANCE</td>
<td>1.4</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>1.9</td>
</tr>
<tr>
<td>INDIA</td>
<td>2.0</td>
</tr>
<tr>
<td>GERMANY</td>
<td>2.1</td>
</tr>
<tr>
<td>GREECE</td>
<td>2.6</td>
</tr>
<tr>
<td>U.K.</td>
<td>3.0</td>
</tr>
<tr>
<td>EGYPT</td>
<td>3.2</td>
</tr>
<tr>
<td>SWITZERLAND</td>
<td>3.5</td>
</tr>
<tr>
<td>ITALY</td>
<td>3.8</td>
</tr>
<tr>
<td>JAPAN</td>
<td>5.5</td>
</tr>
<tr>
<td>WORLD</td>
<td>1.6</td>
</tr>
</tbody>
</table>
2050

We must **FREEZE** the footprint of **FOOD** now!

Source: Living Planet Report 2014, WWF in collaboration with Global Footprint Network, Water Footprint Network and ZSL Living Conservation
Feed production also has huge environmental impacts
## Animal Protein Sustainability Metrics

<table>
<thead>
<tr>
<th></th>
<th>Feed conversion (kg feed/kg edible weight)</th>
<th>Protein efficiency (%)</th>
<th>N emissions (kg/ton protein produced)</th>
<th>P emissions (kg/ton protein produced)</th>
<th>Land (tons edible product/ha)</th>
<th>Consumptive freshwater use (m³/ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>31.7</td>
<td>5</td>
<td>1200</td>
<td>180</td>
<td>0.24 – 0.37</td>
<td>15497</td>
</tr>
<tr>
<td>Chicken</td>
<td>4.2</td>
<td>25</td>
<td>300</td>
<td>40</td>
<td>1.0 – 1.2</td>
<td>3918</td>
</tr>
<tr>
<td>Pork</td>
<td>10.7</td>
<td>13</td>
<td>800</td>
<td>120</td>
<td>0.83 – 1.10</td>
<td>4856</td>
</tr>
<tr>
<td>Finfish (avg)</td>
<td>2.3</td>
<td>30</td>
<td>360</td>
<td>148</td>
<td>0.15 – 3.70</td>
<td>5000</td>
</tr>
<tr>
<td>Bivalves</td>
<td>not fed</td>
<td>not fed</td>
<td>-27</td>
<td>-29</td>
<td>0.28 – 20.0</td>
<td>0</td>
</tr>
</tbody>
</table>

How is the world responding to the challenge?
Yet Food Production Today Nourishes More People More Efficiently
Water use reduced 41% per lb. carcass wt.
Land use reduced 78% per 1,000 lbs. carcass wt.
Carbon footprint reduced 35% per lb. carcass wt.

## Poultry efficiency

### Broilers – improvement evolution

<table>
<thead>
<tr>
<th></th>
<th>1925</th>
<th>1945</th>
<th>1965</th>
<th>1985</th>
<th>2005</th>
<th>2045*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conversion – kg feed/kg live</strong></td>
<td>4.7</td>
<td>4.0</td>
<td>2.4</td>
<td>2.0</td>
<td>1.7</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>Mortality %</strong></td>
<td>18%</td>
<td>10%</td>
<td>6%</td>
<td>5%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Age (days)</strong></td>
<td>112</td>
<td>84</td>
<td>63</td>
<td>49</td>
<td>42</td>
<td>40</td>
</tr>
<tr>
<td><strong>Live commercial weight - kg</strong></td>
<td>1.0</td>
<td>1.4</td>
<td>1.6</td>
<td>1.9</td>
<td>2.4</td>
<td>3.2</td>
</tr>
</tbody>
</table>

*projected

Source: Dr. Paul Aho, Novus Poultry Roundtable: Feeding the World and the Role of Poultry, January 2010
A Retrospective Analysis of US Poultry Production

EGG FARMERS REDUCE ENVIRONMENTAL IMPACT

Today's hens are producing more eggs and living longer due to better health, nutrition and living environments; yet at the same time egg farms use fewer resources and produce less waste.

U.S. population increase over the last 50 years +72%

Egg production efficiencies developed over 50 years enable farmers to increase productivity

- 27% more eggs per day
- 18% more hens

All while reducing environmental impact

- 26% less daily feed
- 32% less water
- 71% fewer greenhouse gas emissions

IMPROVING FEED

Today's hens use a little over half the amount of feed to produce a dozen eggs.

Using 1960 technology to produce today's supply of 77.8 billion eggs would have required

- 78 million more hens
- 1.3 million more acres of corn
- 1.8 million more acres of soybeans

SAVING WATER

Compared to 1960, today's hens use 32% less water to produce a dozen eggs.

The volume of water conserved would fill

- 3,716 Olympic-sized swimming pools

REDUCING EMISSIONS

2010 egg production has 71% lower greenhouse gas emissions than in 1960.

The amount of CO₂ reduced is equivalent to taking

- 5.2 million cars off the road for a year

Coalition for Sustainable Egg Supply

Source: http://www2.sustainableeggcoalition.org/
Producing 1 billion kg of milk: 1944 vs. 2007

- Animals: 21%
- Water: 35%
- Land: 10%
- Carbon Footprint: 37%

Source: Capper et al, 2009, Journal of Animal Science
2014 SUSTAINABILITY COUNCIL MEMBER REPRESENTATION

- **14%** CROP PRODUCTION & SUPPLIERS
- **33%** DAIRY FARMERS & COOPERATIVES
- **23%** PROCESSORS & MANUFACTURERS
- **6%** RETAIL & QUICK-SERVE RESTAURANTS
- **24%** ASSOCIATIONS, GOV'T & COMMUNITY
How was sustainability improved?

Increased use of precision farming techniques
Improvements in crop yields
Improved genetics, health and nutrition for cattle
Increased use of biogas capture and conversion
Improved implementation of right-sized packaging

Future opportunities to further increase sustainability:

- Continue to increase water recovery and biogas capture
- Explore additional packing alternatives to reduce inputs
- Reduce food waste
- Continue to optimize nutrient application to soil and crop yields
- Further adoption of water efficient irrigation systems

Committed to a journey of continuous improvement

Source: Beef Industry Sustainability Lifecycle Assessment, funded by the Beef Checkoff.
We envision a world in which all aspects of the beef value chain are environmentally sound, socially responsible and economically viable.
A Multi-stakeholder Effort

Producers

Commerce & Processing

Retail

Civil

Constituency

... and 50 additional members
A new cut from executive producer Leonardo DiCaprio now streaming exclusively on Netflix.

THE FILM THAT ENVIRONMENTAL ORGANIZATIONS DON'T WANT YOU TO SEE!

DOWNLOAD NOW! ($4.95)

ORDER THE DVD ($19.95)

ORGANIZE A SCREENING
Current diet
Feeds 7.3 billion people

Switch from grain-fed beef diet to pork/chicken
Feed an additional 257 million people

Replace all meat with milk and eggs
Feed an additional 815 million people

Reduce all grain-fed animal products by 50%
Feed an additional 2 billion people

Switch to an all-plant diet
Feed an additional 4 billion people
Green food

Silicon Valley gets a taste for food

Tech startups are moving into the food business to make sustainable versions of meat and dairy products from plants

Mar 7th 2015 | From the print edition

A PLANT-BASED hamburger patty that bleeds. Meatless chicken strips with the same fleshy and fibrous texture as cooked poultry. Mayonnaise made without eggs that is creamy and smooth. And a vegan beverage that contains all the ingredients for human sustenance, making it unnecessary to bother eating ordinary food every again. Hungry yet?

These are the offerings from a recent crop of Silicon Valley-funded startups which are trying to change the way people eat. The idea of making such products is attracting entrepreneurs and venture-capital firms who think it has already hit a 'tipping point'.
THE FUTURE OF PROTEIN™
BEYOND MEAT NOW AVAILABLE IN WALMARTS NATIONWIDE
CHECK OUR STORE LOCATOR TO FIND A LOCATION NEAR YOU
THE IMPOSSIBLE CHEESEBURGER

We love meat. We love cheese. And for thousands of years we have relied on animals to make them. Impossible Foods has found a better way. We use plants to make the best meats and cheeses you’ll ever eat.
Source: Environmental Impacts of Cultured Meat Production (Environmental Science & Technology, 2011)
Meatless Meals for Dogs and Cats

If you are concerned about your companion animals’ health and about the cruelty of the meat industry, now is the time to stop buying meat-based commercial pet food.

Dangerous and Unsupervised Industry

Feeding companion animals commercial pet foods may be jeopardizing their health. Supermarket pet foods are often composed of ground-up parts of animals that U.S. Department of Agriculture inspectors have deemed unfit for human consumption. The flesh of animals who fall into one of the categories of the four D’s—dead, dying, diseased, or disabled—is what often goes into pet food. One Food and Drug Administration (FDA) specialist says that the unrendered protein in food may come from heads, feet, viscera, and other animal parts. (1) Many of these animals have died of infections and other diseases. Pet food has also been recalled during mad cow disease outbreaks.

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Companion Animal Overpopulation
Animal Shelters
The Pet Trade
Photo Gallery: Companion Animals
“Love them like family, feed them like family.”
What are pork’s opportunities?
VISION
The National Pork Board will elevate U.S. pork as the global protein of choice by continuously and collaboratively working to do what’s right for people, pigs and the planet.

MISSION
The National Pork Board is the catalyst that unites pork producers with key stakeholders focused on building a bright future for the pork industry through research, promotion and education.
Goal: Build Consumer Trust - Working collaboratively with food-chain partners, the National Pork Board will enhance consumer trust in modern pork production by promoting producer adoption of on-farm management practices that reflect our ethical principles and by sharing our commitment to continuous improvement with consumers and key stakeholders.

1. By 2020, producers accounting for 50 percent of U.S. pig production will annually report sustainability performance metrics to a National Pork Board-sponsored sustainability measurement and reporting system.

2. By 2020, the region- and production-weighted national average carbon footprint of the U.S. swine herd will be reduced 5 percent from a 2014 baseline of 2.87 lb. CO$_2$e/lb. live weight of pigs at the farm gate.

3. By 2020, the region- and production-weighted national average water use of the U.S. swine herd will be reduced 5 percent from a 2014 baseline of 18.66 gallons/lb. live weight of pigs at the farm gate.
Goal: Drive Sustainable Production - The National Pork Board will invest in research and producer education programs that enhance the productivity and sustainability of pork production and deliver benefits to producers, consumers and the community.

Goal: Grow Consumer Demand - Working in concert with food-chain partners, the National Pork Board will grow domestic and international consumer demand by focusing on pork’s improved nutrition, quality and sustainability.
We need to do MORE with LESS
Genetics
By-Products and Alternative Feed
Insects?
Climate Change Adaptation
Water
Efficient nutrient recycle
Nutrient Recycling Challenge

About the Challenge

A competition for technologies to recycle nutrients from livestock manure.

Posted By: Environmental Protection Agency
Category: Ideas


Could you have the next big idea for farmers and the environment?

Prizes

Guaranteed Monetary Awards

$20,000.00

A total of up to $20,000 in cash prizes will be awarded; to be split between up to 4 submissions for the first phase of this challenge. At minimum, a $5,000 award is available to the best submission; three additional submissions may also be selected to receive cash awards.

Investors and Partnering Summit

Follow this challenge
Degraded lands
Some WWF US initiatives and partners
Do Consumers Care?

- 67% prefer to work for socially responsible companies
- 55% will pay extra for products and services from companies committed to positive social and environmental impact
- 52% made at least one purchase in the past six months from one or more socially responsible companies
- 52% check product packaging to ensure sustainable impact
- 49% volunteer and/or donate to organizations engaged in social and environmental programs

Source: Doing Well by Doing Good Report, Nielsen, June 2014
The Protein Challenge 2040 is an international innovation partnership to explore how we balance supply and demand of protein for a growing population, in a way that is affordable, healthy, and good for people and the environment.

This is the first time that the animal, plant, and novel protein industries are working together on a global level to tackle the issue of sustainable protein.
WWF Vision

To build a future in which people live in harmony with nature.