All Lives Have Equal Value.
Help Every Person Get the Chance to Live a Healthy, Productive Life.
Our History

1998

Bill and Melinda read an article about rotavirus.

2000

They officially create the foundation.

2006

Warren Buffett decides to give Berkshire Hathaway stock.
What We Focus On

- What affects the most people?
- What has been neglected?
- Where can we make the greatest impact?
How We Focus

- Form critical partnerships.
- Take big risks.
- Find scalable, sustainable solutions.
- Leverage science and technology.
# Global Development Program Grantmaking

Increasing opportunities for the world’s poorest people to lift themselves out of hunger and poverty.

<table>
<thead>
<tr>
<th>Area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Development</td>
<td>Help small farmers boost their productivity, increase their incomes, and build better lives.</td>
</tr>
<tr>
<td>Financial Services for the Poor</td>
<td>Expand access to safe, affordable financial services in developing countries.</td>
</tr>
<tr>
<td>Water, Sanitation, and Hygiene</td>
<td>Provide hundreds of millions safe and sustainable access to sanitation and clean water.</td>
</tr>
<tr>
<td>Global Libraries</td>
<td>Provide free access to computers and the Internet in thousands of libraries worldwide.</td>
</tr>
<tr>
<td>Special Initiatives</td>
<td>Pursue other ways outside our core areas of giving to help people lift themselves out of poverty and hunger.</td>
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</tbody>
</table>
Millennium Development Goals

1. Poverty & hunger
2. Primary education
3. Gender equality
4. Child mortality
5. Maternal health
6. Combat diseases
7. Env’t sustainability
8. Partnerships

www.un.org/millenniumgoals
Global Food Systems

Nostradamus
Introduction: The global food system

- Production, processing & distribution of food

10,000-year evolutionary process
160,000-year-old fossilized skulls uncovered in Ethiopia are oldest anatomically modern humans.
All lives have equal value

- Food supply has tripled in the past 30 years
- There is enough food for each person on Earth to have 3,500 calories / day.
- The available daily supply per person is as follows:
  - 2.3 pounds of grain, beans, nuts
  - 1.0 pounds of fruits and vegetables
  - 1.0 pounds of meat, milk and eggs
Yet the global food system has failed to keep pace with demand requirements

- 6.8 B people live on the Earth
- 1.6 B live on < $1 / day
- 3.0 B live on < $2 / day
- 80 percent make < $10 per day
- Over 1 billion people are food insecure and will go to bed hungry in 2010
- < $2 / day: mostly rice and grains
- $2 - $9 / day: more diet diversity
- > $9 / day: packaged, luxury food
Percentage of people living on < $1/day
Key drivers of change

- Improving upon the global food system
  - Preparing human resource capacity to provide services within the global food system

Inputs → Production → Processing → Distribution

Food Value Chain
Climate Change

- One of the most important rate-limiting aspects for growth of agricultural productivity
  - Crop and livestock agriculture draw 70% of worldwide freshwater resources
Climate Change

Agriculture: 70% H$_2$O & 25% of greenhouse
India: 20% pop & 4% H$_2$O
Energy

- Price and availability are key inputs for agricultural production
  - Rising price of hydrocarbon fuels
  - Biofuels as temporary supplement
  - With such heavy dependence on fossil fuels, energy is an ever-present rate-limiter
Energy

- Reserve = 1,000,000,000,000 Barrels
- Daily use = 84,000,000 Barrels
- 32 years or in 2042 we run out
- Gas, Coal, Solar, Nuclear, Wind, Alcohol, Hydroelectric, Geothermal, Biogas, Hydrogen
Agriculture & Energy

- Chemical fertilizer production = 70% of ag energy consumed in the developing world.
- Grazing and crops for feed = 80% of ag land.
Natural Resource Mismanagement

- Ecosystem health and environmental degradation

  - < 1/32 land and water can support our terrestrial and water-based food system
  - Poor resource management
  - 5-10 M ha arable land lost per year to deforestation, overgrazing, unsound ag practices
  - .3-1.5 M ha lost to salinization, waterlogging
  - 2/3 degraded land in S. Asia and Africa
  - 12 million hectares are lost to deserts each year. That is enough land to grow 20 million tones of grain=approximately the size of Ohio!
Africa represents about 60 percent of the potentially available cropland in the world.
Human Health & Safety

- Ecosystem and human health
  - One Health, Food Safety, Food Security
  - Impact of improper pesticide use
    - Current rate of pesticide use 2.5 M tons/year – unsustainable
- Healthy agro-ecosystem
- Sustainable intensification
- Stewardship of our natural resource base
- Integrated soil fertility and pest management,
- Genetic resource biodiversity
- Zoonotic disease
- Irrigation/land degradation
Population Growth

- + 3B over next 40 years
  - Urban populations to double by 2050
  - Changing consumption patterns
- How to double food production without harm to the environment?
- Japanese term for “Population”
World Population Growth

Billions of people

YEAR

Source: PRB
# Population Growth

<table>
<thead>
<tr>
<th></th>
<th>ITALY</th>
<th>DEM. REP. OF THE CONGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 Population</td>
<td>59.9 million</td>
<td>66.5 million</td>
</tr>
<tr>
<td>2025 Population</td>
<td>62.0 million</td>
<td>109.7 million</td>
</tr>
<tr>
<td>Population below Age 15</td>
<td>8.4 million</td>
<td>31.3 million</td>
</tr>
<tr>
<td>Population Age 65 and Older</td>
<td>11.9 million</td>
<td>1.7 million</td>
</tr>
<tr>
<td>Annual Births</td>
<td>568,000</td>
<td>2.9 million</td>
</tr>
<tr>
<td>Annual Deaths</td>
<td>575,000</td>
<td>843,000</td>
</tr>
<tr>
<td>Annual Natural Increase (births - deaths)</td>
<td>- 7,000</td>
<td>2.1 million</td>
</tr>
<tr>
<td>Annual Infant Deaths</td>
<td>2,300</td>
<td>270,000</td>
</tr>
<tr>
<td>Life Expectancy at Birth</td>
<td>81 years</td>
<td>53 years</td>
</tr>
<tr>
<td>% of Population Undernourished</td>
<td>&lt; 2.5%</td>
<td>74%</td>
</tr>
</tbody>
</table>

Source: Carl Haub and Mary Mederios Kent, *2008 World Population Data Sheet.*
World population facts

- Aug. 1, 2010 world population = 6.8 B
- In the year 2050, world population = 9.1 B
- In 1950, the developing world = 2x developed world.
- In 2050, the developing world = 6x developed world.
- Nine countries account for > 50% of the increase.
- The USA is the only developed country in the 9 countries accounting for 50% of the increase.
- 33% of US growth will come from immigration.
Policy & Governance

- Strong policies, national & international governance
- International regulatory framework
Market Access
Market Access

- Trade integration and access to information
- Advent of the 24/7 “virtual farm”
- Efficient distribution system
- Less-developed countries spend up to 80% income on food
Integration of Global Food Systems

- Scalability and integration of larger food systems
  - Reduce unit costs
  - Decrease risk
  - Top 5 food retailers account for 50% gross US food sales
Technology

- The first Green Revolution reduced poverty 20% over 20 years
  - Improved seeds increase crop yields/ha
  - Knowledge and tech transfer to farmers represent significant potential gains
  - Technology adoption and natural food production
    - Maintain focus of innovation on consumer needs
    - *Tomorrow’s Table*, Dr. Pamela Ronald & Raoul Adamchak
Human Capacity

- Leadership
  - Innovation to improve global food systems
  - Less-developed world: 2/3 labor force engages in farming and livestock
  - Developed world: <1% work in agriculture

Is this a truly *global* food system?
  - >1B live with food insecurity today
  - >1B suffer obesity

Emerging role of veterinarians
  - Crops
  - Livestock
  - Wildlife
  - Aquaculture
  - People
Human Capacity

- Food and Agriculture = $1T industry in the USA
- Assume payroll = 25% of revenue
- Assume jobs >$100K salary/yr = 10% of payroll
- Thus $1T x 2.5% = $25B in potential veterinary payroll
- $25B/$100K salary = 250,000 jobs
- If veterinarians could have 5% of these positions then there would be 12,500 new jobs!
In the future, the producer will become more of a cost center as the profit margin moves towards the retailer in the developed world. The retailer is close to the customer and has the emerging power in the value chain.
% Sows Represented by Top Ten Producers

* Excludes cooperatives
Global Packer Consolidation: % National Slaughter by < 5 packers

- Den
- Chile
- Can
- USA
- Mex
- Brazil
- Germ
- Spain
- China
# Leading Retailers in Global Food Sales (2007)

<table>
<thead>
<tr>
<th>SUPERMARKETS</th>
<th>HYPERMARKETS</th>
<th>DISCOUNTERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kroger Co</td>
<td>Wal Mart</td>
<td>Aldi</td>
</tr>
<tr>
<td>Safeway Inc</td>
<td>Carrefour SA</td>
<td>Schwarz Beteiligungs GmbH</td>
</tr>
<tr>
<td>Tesco Plc</td>
<td>Tesco Plc</td>
<td>Supervalue Inc</td>
</tr>
<tr>
<td>Royal Ahold NV</td>
<td>Auchan Group SA</td>
<td>Tengelmann Group</td>
</tr>
<tr>
<td>ITM Enterprises SA</td>
<td>E Lecierc</td>
<td>Carrefour SA</td>
</tr>
<tr>
<td>Top 15 = 31%</td>
<td>Top 15 = 72%</td>
<td>Top 15 = 68%</td>
</tr>
</tbody>
</table>
Top Five US Supermarket Retailers (2009)

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Wal-Mart</td>
<td>259</td>
</tr>
<tr>
<td>Kroger</td>
<td>77</td>
</tr>
<tr>
<td>Costco</td>
<td>73</td>
</tr>
<tr>
<td>Supervalu</td>
<td>45</td>
</tr>
<tr>
<td>Safeway</td>
<td>44</td>
</tr>
</tbody>
</table>

These top five account for 56% of the market in the USA.
The Four Actions Framework

- Which factors of our service does the industry take for granted that we could:
  1) ELIMINATE
  2) REDUCE from current standards
  3) ELEVATE above current norms
  4) CREATE, which are new to the industry

Source: *Blue Ocean Strategy*
Four Actions Framework for Veterinarians

**ELIMINATE**
Income from sales of drugs.

**ELEVATE**
Measurement of our contribution.
Level of management involvement.
Leadership skills.
Level of technology adoption.

**REDUCE**
View as “only” a technical person.
Any technician-type activity.

**CREATE**
A global perspective.
A food chain understanding.
A position as a business person.

Source: *Blue Ocean Strategy*
Technology

- Personalized genomics (Prescription Food, Functional Food, GMO’s, plant-based pharma)
- Semantic internet (Cyber Butler)
- Nanotechnology (Nanotagging, drug delivery, disease tracking)
- Quantum computing (Increased speed of computing for predictive diagnostic trends) linked with pathogen detection
- Data visualization (Google Earth, web cam monitoring) and augmented reality.
Elevation of our service beyond current norms: some ideas

- Direct involvement in the management of business operations.
- Improve training in specific areas of business.
- Technology adoption in key areas to improve agricultural productivity, waste reduction, or quality in ways which benefit the environment and the animal.
- A commitment to measure the outcomes of our contributions by having performance based compensation.
Technologies impacting veterinary medicine

- Personalized genomics: Prescription Food, Functional Food, GMO’s, plant-based pharma
- Semantic internet (Cyber Butler)
- Nanotechnology: Nano-tagging, drug delivery, disease tracking
- Quantum computing: Increased speed of computing for predictive diagnostic trends linked with pathogen detection
- Data visualization: Google Earth, web cam monitoring and augmented reality.
Macro Changes: The consumer is our boss!

- Changes in the way we learn: DVM as an online degree?
- Prophylaxis versus treatment: >80% of animal health revenue is for treatment.
- Ecosystem health: carbon credits and agriculture
- Ethnicity and gender issues: changes in food preferences & workforce
- Bio-Terrorism: One health initiative
- **Green revolution** moving to **Blue revolution**:
  - Craig Venter and the Sorcerer II expedition
  - The **Brown revolution**
- Animal law and legal rights: animal welfare
- Prescription food: consumer driven
Discussion questions

- What is happening/going to happen?
  
  *The opportunity for the veterinary profession to redefine its role.*

- What are the implications for veterinary medicine in addressing this?
  
  *Human resource capacity, licensure, expanded role.*

- What changes will be required within veterinary medicine to be able to address this issue?
  
  *Licensure requirements, curricular change, fight traditional views.*

- What specific recommendations would you make to the College?
  
  *Determine future educational needs, change curriculum, implement with new networks (e.g. not just drug companies)*
Final thoughts

- Poverty causes hunger, not food supply.
- Population growth: 3B in next 45 years.
- Food supply will need to increase 2-3x.
- Many poor people will begin to consume meat as GNP rises.
- We will not be able to grow food supply by further deforestation of our land resource and pollution of water.
- Organic systems should be put in balance with GMO crops; they can co-exist.
Final thoughts

• New skills and new service based offerings will be needed for veterinarians to participate effectively.
• Poultry animal health systems have done a great job and the swine industry is following their template.
• The beef cattle industry (globally) will be slow to make these same changes.
• Companion animal health will have strong product innovation, novel therapeutic areas and will quickly become an industrialized and “crowded market”.
• Production animal health will have product (bios) innovation combined with some level of service bundling due to the nature of the segmented market.
Final thoughts

- The consumer is our “boss”
- Agribusiness represents 15% of the US GDP ($1T) and 40% of GDP in the less developed world.
- What an opportunity for the veterinary profession, including veterinary para-professionals to provide leadership and service to this fundamental global sector!!