



COLLEGE OF  
AGRICULTURE AND  
LIFE SCIENCES  
VIRGINIA TECH™



GLOBAL AGRICULTURAL  
PRODUCTIVITY REPORT®



# SUPPORTING PARTNERS



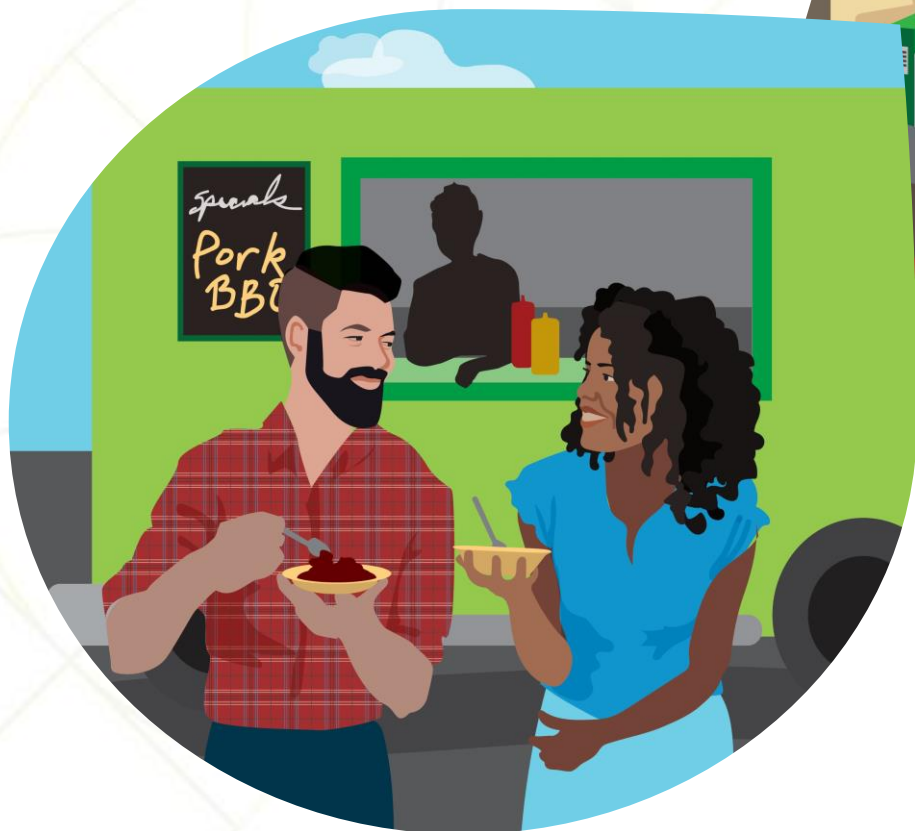
# CONSULTATIVE PARTNERS



# THE GLOBAL AGRICULTURAL IMPERATIVE FOR A HEALTHY SUSTAINABLE WORLD



# CONSUMER TRENDS AROUND THE WORLD



# MILLENNIALS AND WOMEN DRIVING CHANGE



# WHAT DOES THIS MEAN FOR OUR FOOD SYSTEM?



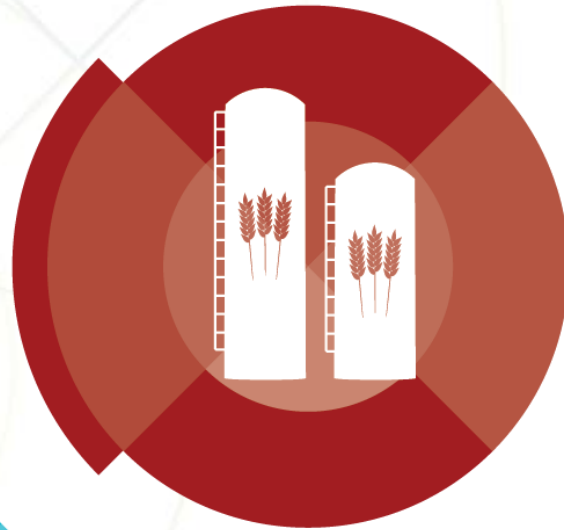
# ENABLING POLICY ENVIRONMENT



# POLICIES FOR PRODUCTIVE SUSTAINABLE AGRICULTURE



**R&D AND  
EXTENSION**



**PRIVATE-SECTOR  
INVOLVEMENT**



**TRADE**



**TECHNOLOGY**



**CULTIVATE  
PARTNERSHIPS**



# SUSTAINABLE AGRICULTURE...



ENHANCES ENVIRONMENTAL QUALITY



IMPROVES THE LIVES OF PRODUCERS & SOCIETY AS A WHOLE



SATISFIES HUMAN NEEDS



SUSTAINS THE ECONOMIC VITALITY OF AGRICULTURE

# PRODUCTIVITY IS DIFFERENT FROM...



## OUTPUT

GROSS AMOUNT OF CROPS  
OR LIVESTOCK PRODUCED



## YIELD

AMOUNT OF OUTPUT  
PER UNIT OF PRODUCTION



# TOTAL FACTOR PRODUCTIVITY (TFP)

MEASURES CHANGES

IN THE  
EFFICIENCY

WITH WHICH  
INPUTS

ARE  
TRANSFORMED

INTO  
OUTPUTS

TFP INCREASES WHEN OUTPUTS RISE

GROSS  
CROPS



GROSS  
LIVESTOCK



WHILE INPUTS REMAIN CONSTANT



LAND



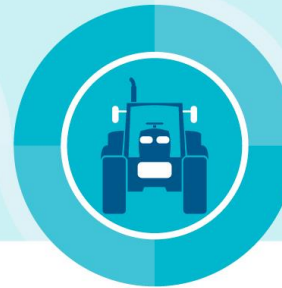
LABOR



FERTILIZER



FEED



MACHINERY



LIVESTOCK

# HOW DOES PRODUCTIVITY GROW?



**PRODUCTIVITY  
IS IN THE  
GENES**



**PRODUCTIVITY  
FROM  
SEED TO FEED**



**HEALTHY  
PRODUCTIVE  
PIGS**

# STRATEGIES FOR MEETING GLOBAL DEMAND

**LAND  
EXPANSION**

**EXTEND  
IRRIGATION**

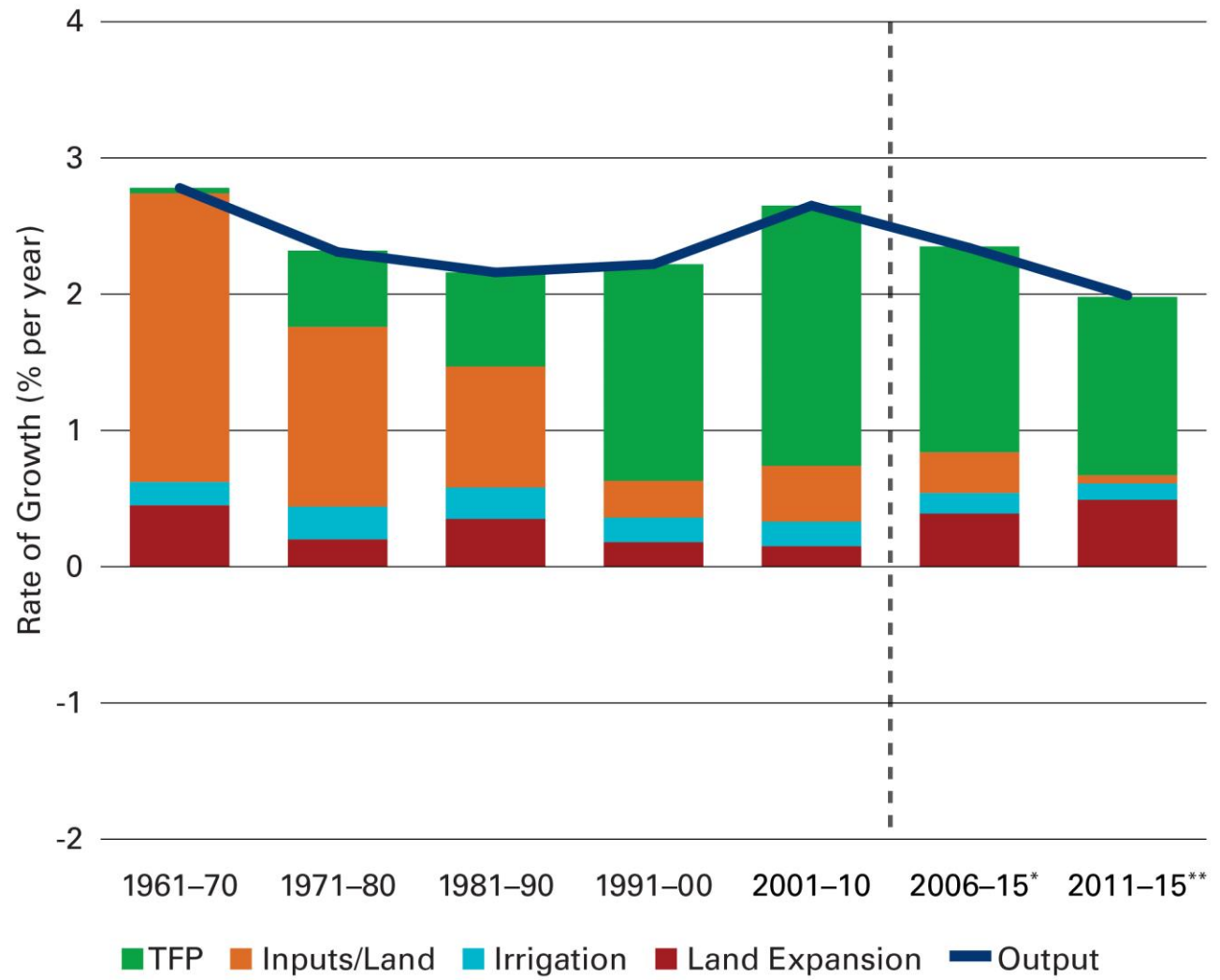
**INPUT  
INTENSIFICATION**

**TOTAL  
FACTOR  
PRODUCTIVITY**



# Sources of Growth in Agricultural Output GLOBAL

Sources of Growth in **Global** Agricultural Output, 1961–2015

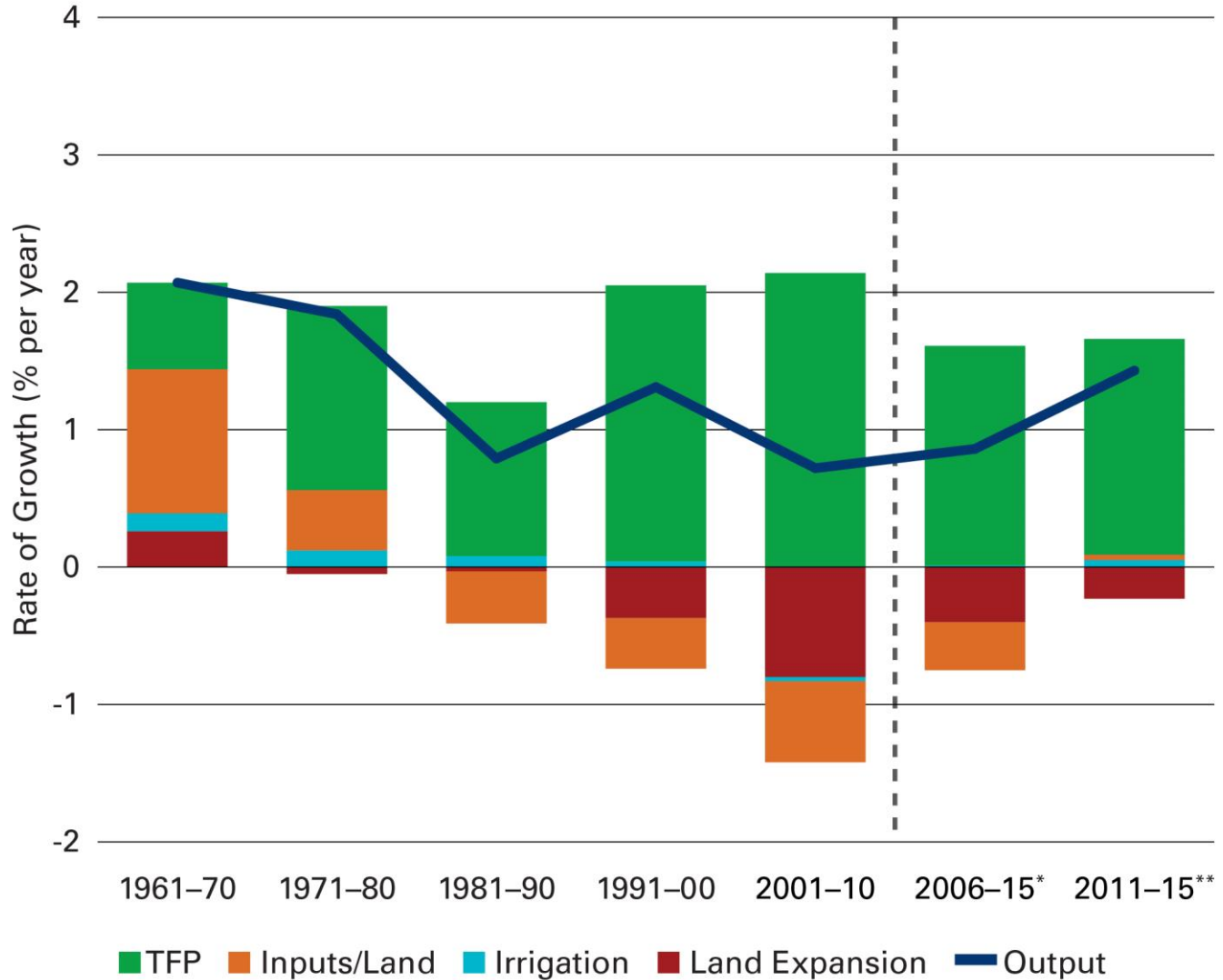


\*Depicts data for the most recent ten-year period. \*\*Depicts data for the most recent five-year period.  
Source: USDA Economic Research Service (2018).



# Sources of Growth in Agricultural Output HIGH-INCOME

Sources of Growth in Agricultural Output:  
High-Income Countries, 1961–2015



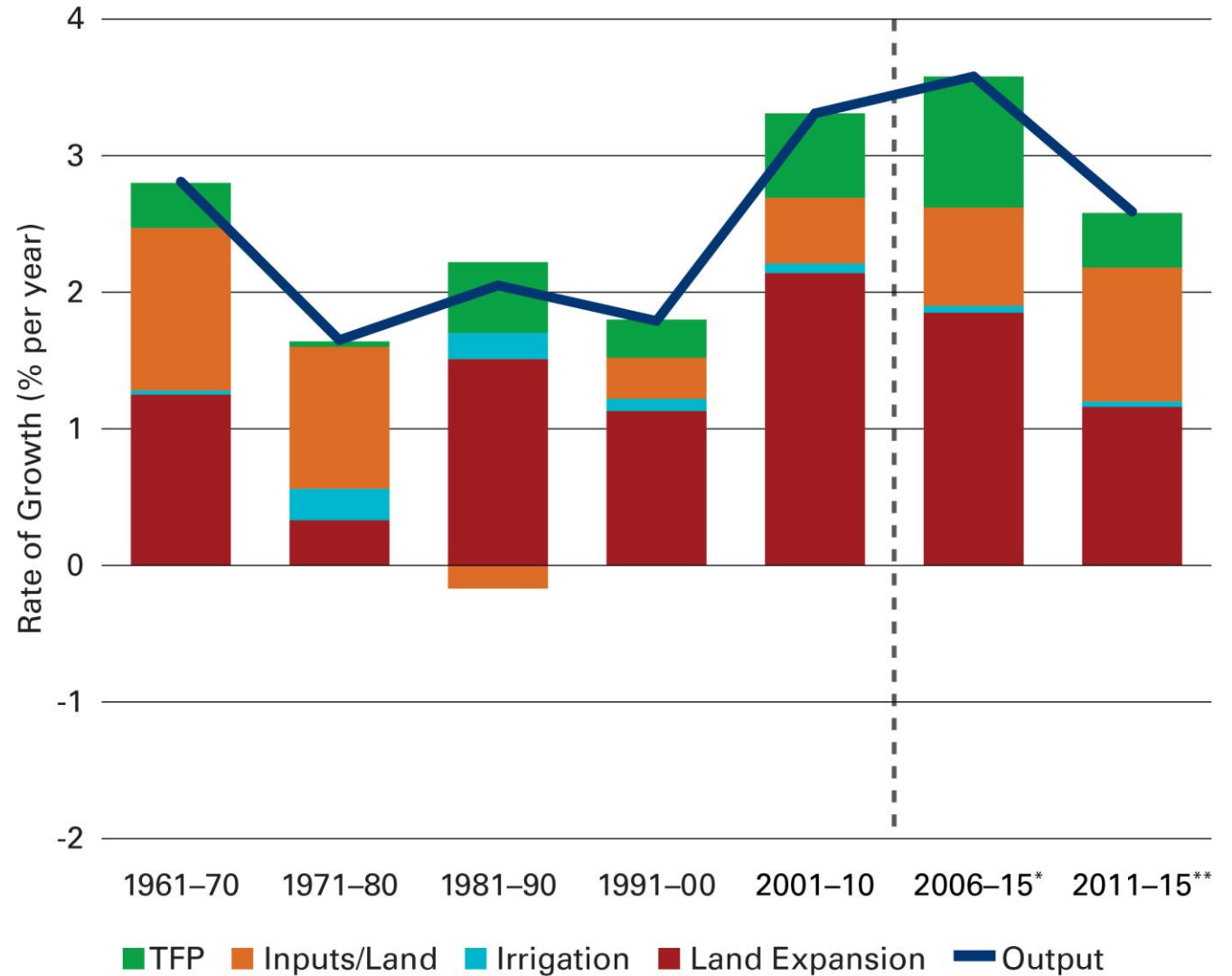
\*Depicts data for the most recent ten-year period. \*\*Depicts data for the most recent five-year period.  
Source: USDA Economic Research Service (2018).



# Sources of Growth in Agricultural Output

## LOW-INCOME

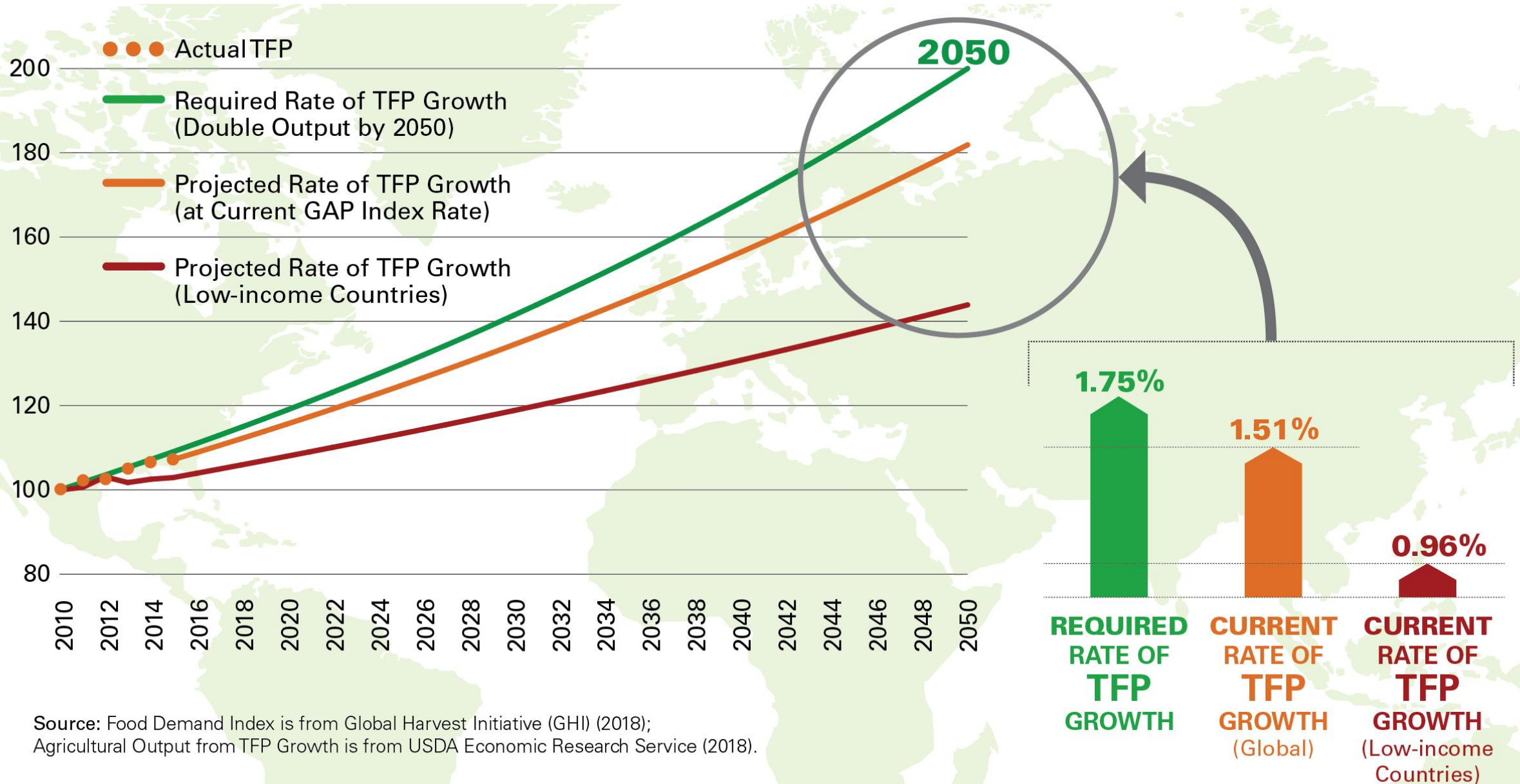
Sources of Growth in Agricultural Output:  
Low-Income Countries, 1961–2015



\*Depicts data for the most recent ten-year period. \*\*Depicts data for the most recent five-year period.  
Source: USDA Economic Research Service (2018).



# TRACKING PRODUCTIVITY: THE GAP INDEX™

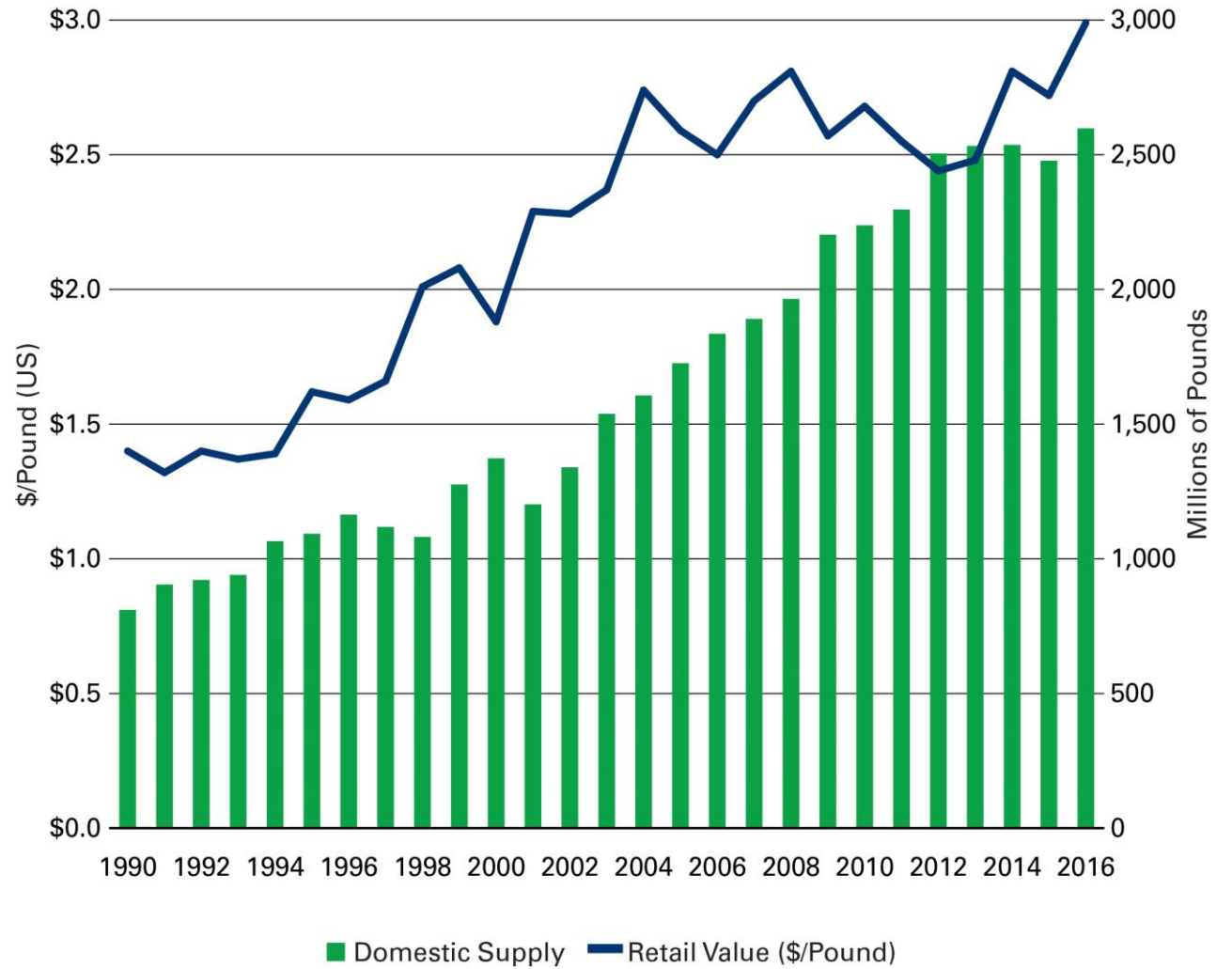


Source: Food Demand Index is from Global Harvest Initiative (GHI) (2018);  
 Agricultural Output from TFP Growth is from USDA Economic Research Service (2018).

# Productivity for Nutrition

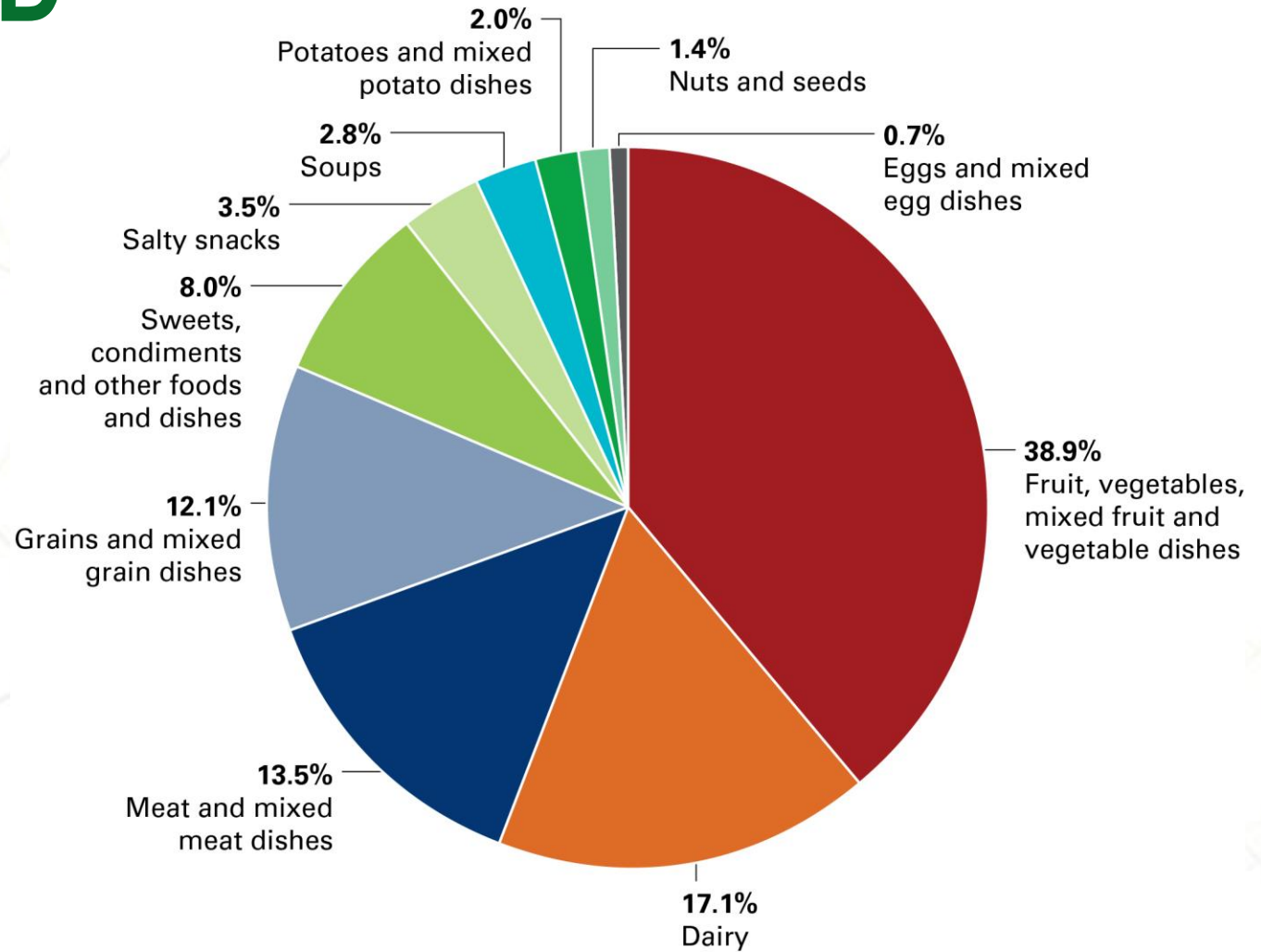


Fresh Strawberries-U.S. Domestic Supply and Retail Value, 1990–2016



# FOOD WASTED = NUTRIENTS LOST

Daily Per Capita Food Waste by U.S. Consumers,  
2007–2014 (annual average)



Source: Conrad Z, Niles MT, Neher DA, Roy ED, Tichenor NE, Jahns L (2018) Relationship between food waste, diet quality, and environmental sustainability. PLoS ONE 13(4): e0195405. <https://doi.org/10.1371/journal.pone.0195405>.

# FOOD WASTED = PRODUCTIVITY LOST

## AGRICULTURAL INPUTS AND RESOURCES USED TO PRODUCE WASTED FOOD (U.S.)

Cropland	30 million acres
Irrigation Water	4.2 trillion gallons
Pesticide	780 million pounds
Fertilizer (Nitrogen, Phosphorus, Potash)	5.6 billion pounds

# TRANSFORMING FOOD AND AGRICULTURE

CONSUMERS



ENVIRONMENT



PRODUCERS



# HARVESTING ZINC FOR HEALTHY SOILS, CROPS & PEOPLE

- Addressing zinc deficiency, a form of “hidden hunger”
- Promoting agronomic biofortification & soil fertilization of staple grains
- Doubled zinc levels in harvested grain



The Mosaic Company  
HarvestPlus

# A NEED FOR SEEDS AND SEED SYSTEMS

- Improving micronutrient content of sorghum and millet
- Strengthening research capacity through partnership
- Tailoring seed systems for small producers



Corteva Agriscience™  
ICRISAT



# MECHANIZATION IS A PATH TO PRODUCTIVITY

- Expanding affordable mechanization services for small producers in Nigeria
- Creating access to commercial markets
- 100,000 farmers will benefit

John Deere  
Tata Group  
Alluvial



# MOOVE OVER COWS; GOATS GOT MY DAIRY!



**IICA**

# A MODEL FOR HEALTHY AG SYSTEMS



**THE NATURE CONSERVANCY**

# GAP REPORT<sup>®</sup> GOES DIGITAL!

[www.GlobalAgriculturalProductivity.org](http://www.GlobalAgriculturalProductivity.org)

