

# Global Pulse Production and Consumption Trends: The Potential of Pulses to Achieve 'Feed the Future' Food and Nutritional Security Goals

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# Outline

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- Setting the stage
  - Global context
  - The vision of 'feed the future'
  - World dry grain pulses - Facts and trends
- Looking ahead
  - Realizing the vision of 'feed the future' – what role for research on dry grain pulses in reducing poverty and improving nutrition, health and environment?

# Global context: Growing food demand

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- Increasing population
  - In the coming decades the world's producers will need to feed an additional 3 billion people
  - Nearly all the growth in population will be occurring in developing regions of the world
- Increasing demand for food per capita
  - Not only are the number of people to feed increasing, but each one will be demanding more food

*Implication: The world's growing population will require a 70% increase in agricultural production by 2050 (Bruinsma 2009).*

# Global context: Stagnating food supply and volatility in food prices

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- Dwindling resources
  - Limited supplies of good quality arable land and accessible fresh water
  - Stagnating yields of major staple crops
- Competing uses of productive resources for energy
  - Rising food prices and volatility
- Increased climatic variability
  - Increased risks of production losses

*Implication: These supply side factors underscore the fragility of global food security, with recent estimates that nearly a billion people are food insecure (Shapouri 2010)*



# Global Challenge

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How to increase **agricultural productivity** in an **environmentally sound** manner while improving the availability of **nutritious foods** for a growing population?

‘Feed the Future’ represents U.S. Government’s response to address this global challenge of food security

# About 'Feed the Future' (FTF)

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- ❑ Its goal: to sustainably reduce global poverty and hunger (aligned with MDGs)
- ❑ Focus Areas:
  - Inclusive agriculture sector growth
  - Improved nutrition
  - Private sector engagement
  - **Research and capacity building** →
  - Gender integration
  - Environment-sensitive development

**Is considered a critical component of the Feed the Future initiative**

# Feed the Future Research Strategy

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- ❑ An integral strategy within the broader *Feed the Future* Initiative
- ❑ Supports a global research portfolio to:
  - Create more **productive crops**
  - **Sustainably intensify** agricultural production systems
  - Ensure **food security**, and
  - Enhance access to **nutritionally improved diets**.
- ❑ Based on the premise that research and innovation in agriculture and nutrition are necessary to increase food security and help developing countries feed themselves



# Main Elements of the Research Strategy

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- ❑ Supports research that is purpose-driven and impact-oriented across three themes
  - Advancing the productivity frontier
  - Transforming production systems
  - Enhancing nutrition and food safety
- ❑ Addresses three cross-cutting issues
  - Gender
  - Climate change
  - Environment
- ❑ Calls for closer ties across the three stages of research—discovery, development and deployment
- ❑ Is country led (identifies focus countries and regions)



# Dry Grain Pulses in the Context of Feed the Future Initiative

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- ❑ It is one of the few commodity groups that fits in all the themes of the FTF research strategy
  - ☑ Advancing the productivity frontier
  - ☑ Transforming production systems
  - ☑ Enhancing nutrition and food safety
  - ☑ Gender
  - ☑ Climate change
  - ☑ Environment
- ❑ As a commodity group, it is thus uniquely positioned to contribute towards all the FTF goals (i.e., sustainably reducing poverty and hunger, and enhancing nutrition, health and environment)

# Dry Grain Pulses: Its Importance

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- ❑ Play diverse roles in the farming systems of developing countries
  - Food crop (consumed as grain, green pods and leaves) (contributes to food security and dietary diversity goal)
  - Cash crop (source of income → poverty goal)
  - Fodder crop (contributes to the productivity of the livestock system)
  - Rotation crop, intercrop with cereals and roots/tubers (reduces soil pathogens and provides nitrogen → environmental sustainability goal)
- ❑ They can grow in harsh environments (drought prone) where there are few options (food security goal and climate change)

# Dry Grain Pulses: Importance (cont'd)

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- ❑ In many systems, they are produced and marketed by women (gender goal)
- ❑ In dietary terms, food legumes
  - Complement cereal crops as a source of protein and minerals (contributes to nutrition goal)
  - Provide bioactive compounds (health benefits in the form of reducing risk to some chronic diseases)
  - Provide a rich source of fiber and a 'health food ' to combat growing public health concerns associated with an urban life-style (obesity and over-nutrition)



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**In light of the importance of grain  
pulses,**

**And to frame subsequent discussions,**

**Lets look at some facts and trends in productivity,  
consumption and price of grain pulses...**

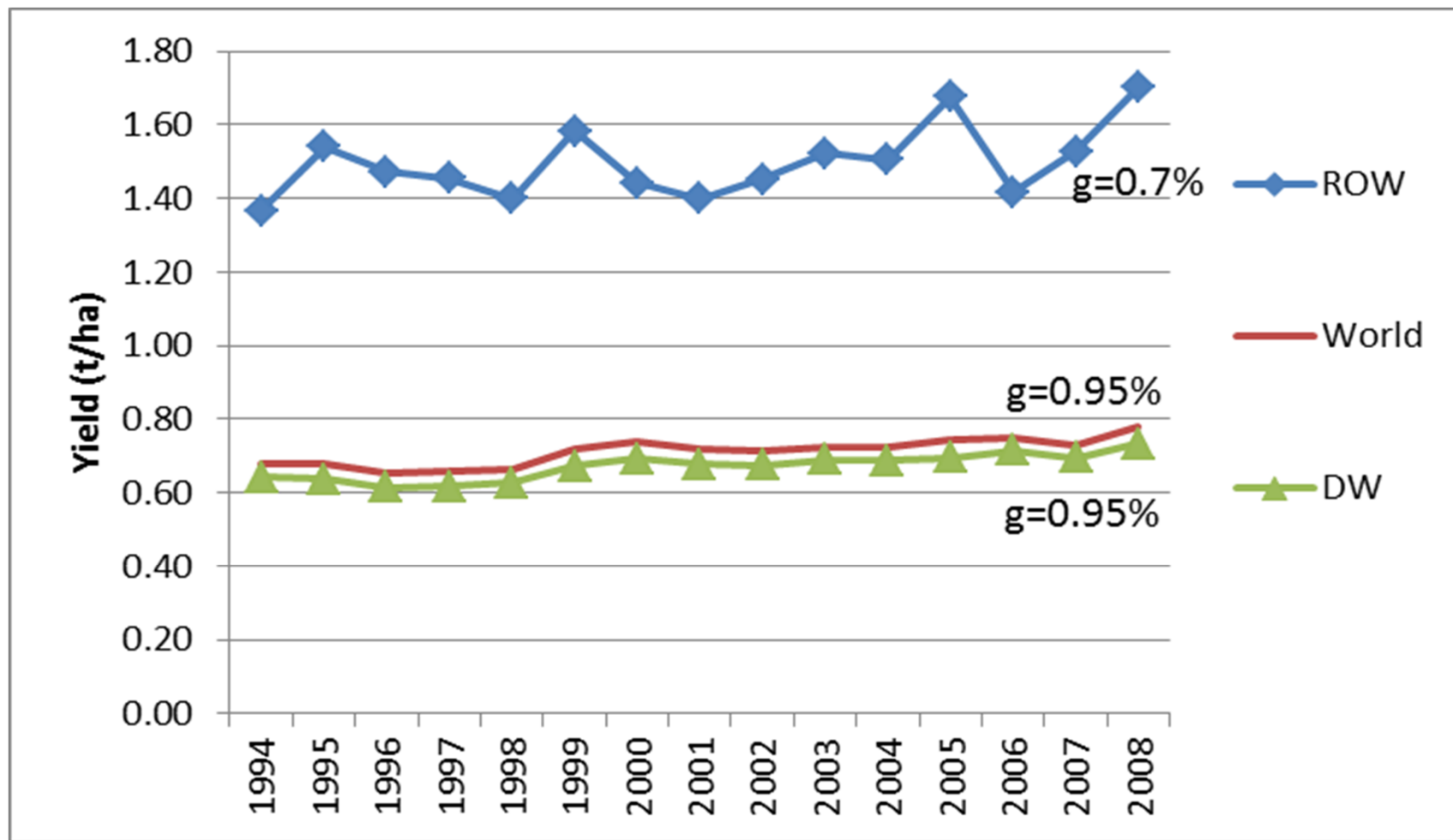
# Area, Production and Yield of Major Grain Pulses in Developing Countries (2006-08)

Major Grain Pulses	Area harvested (m ha)	Production (m tons)	Yield (t/ha)
Common beans	15.00	10.65	0.71
Cowpeas	12.26	5.64	0.46
Other dry beans	11.10	7.88	0.71
Chickpeas	10.41	8.22	0.79
Pigeonpea	4.73	3.74	0.79
Lentils	2.70	2.08	0.77
Faba beans	1.05	1.67	1.59
<b>TOTAL</b>	<b>57.25</b>	<b>39.88</b>	<b>0.70</b>

In terms of area harvested, grain pulses are as important as maize and wheat in developing countries

*Source: FAOSTAT. Estimates for common beans, cowpeas and other dry beans from Akibode and Maredia (2011)*

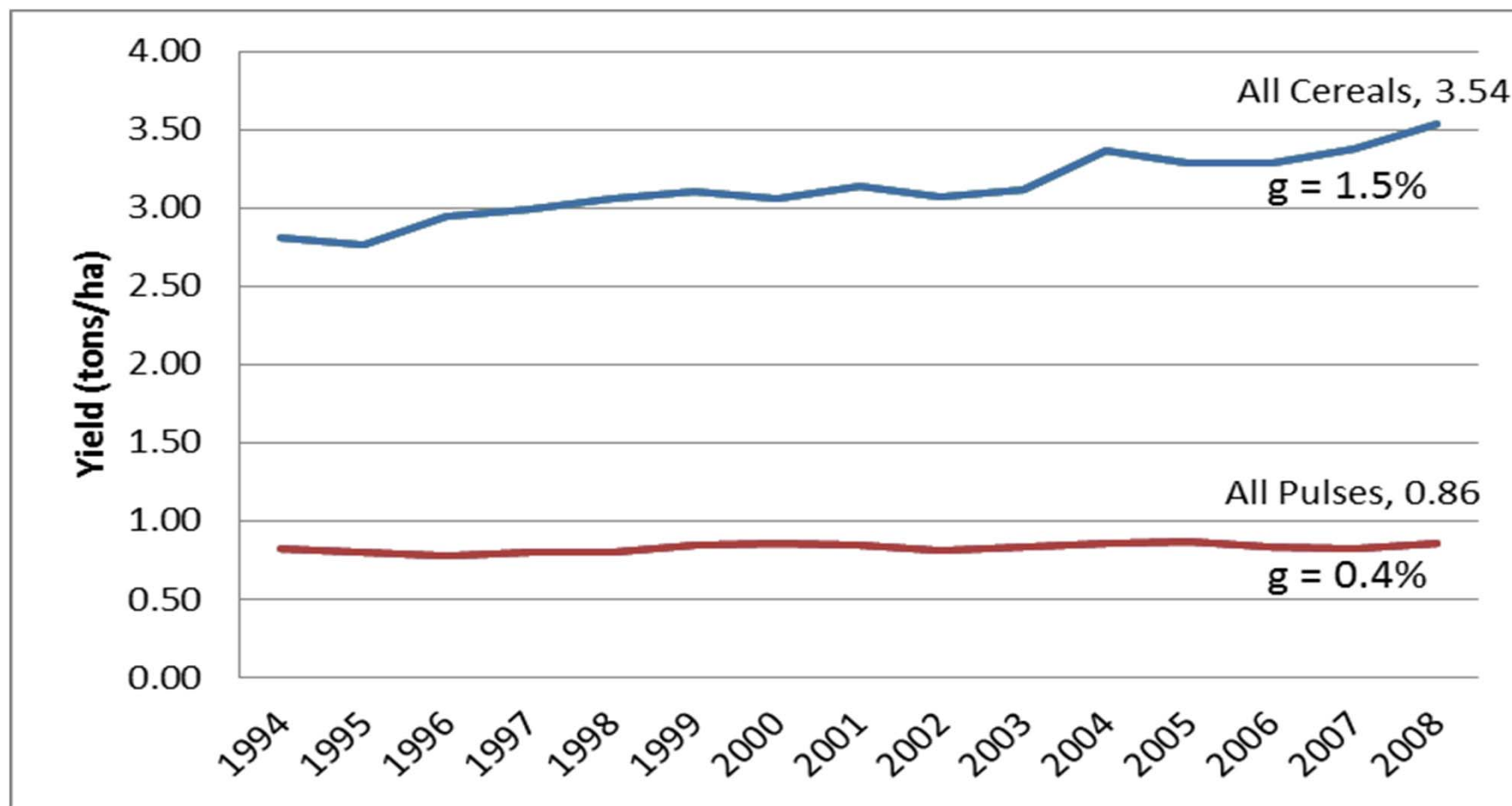
# Aggregate yields of selected grain legume crops in Developing countries and Developed countries, 1994-2008



Source: FAOSTAT

DW=Developing world; ROW=rest of the world

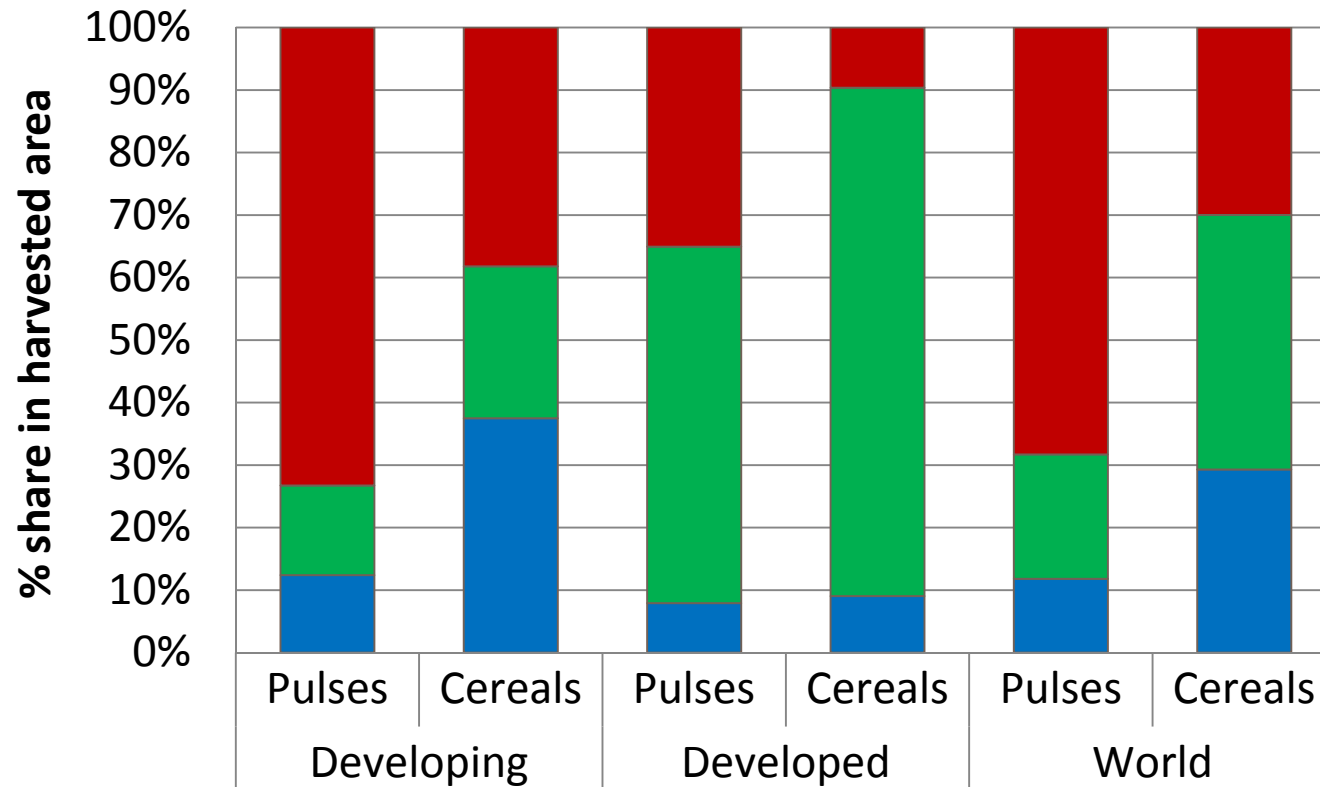
# Global yield trends for cereal and pulse crops, 1994-2008



Source: FAO

Data refers to FAO category “cereals, total” and “pulses, total”)

# Production systems where pulse crops are grown compared with cereal crops (m ha)

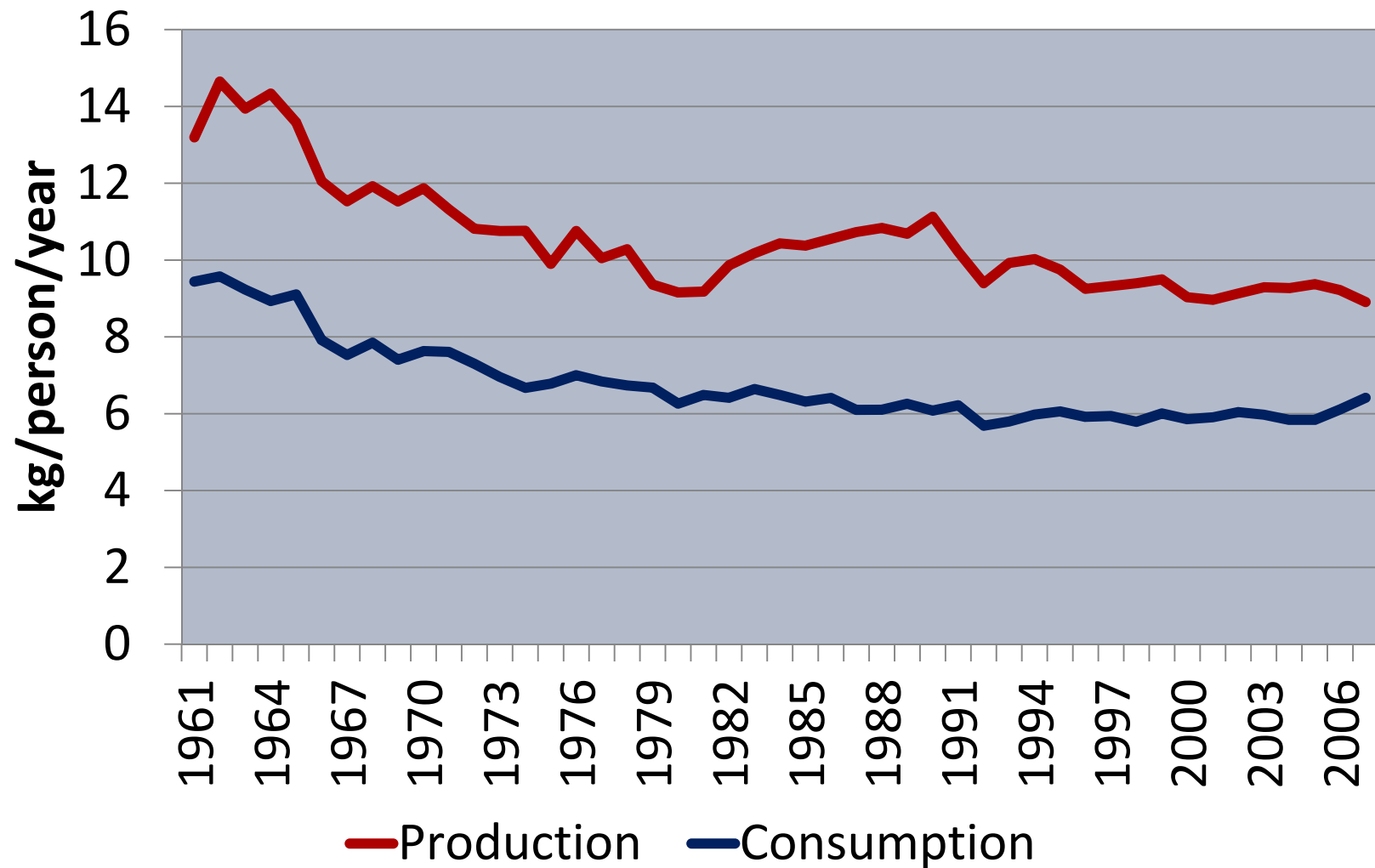


■ Rainfed--Low input	43.15	178.03	3.08	18.09	46.24	196.13
■ Rainfed--High input	8.45	113.21	5.02	153.20	13.47	266.41
■ Irrigated	7.31	174.76	0.70	17.06	8.01	191.82

Source: HarvestChoice (SPAM database circa 2000)

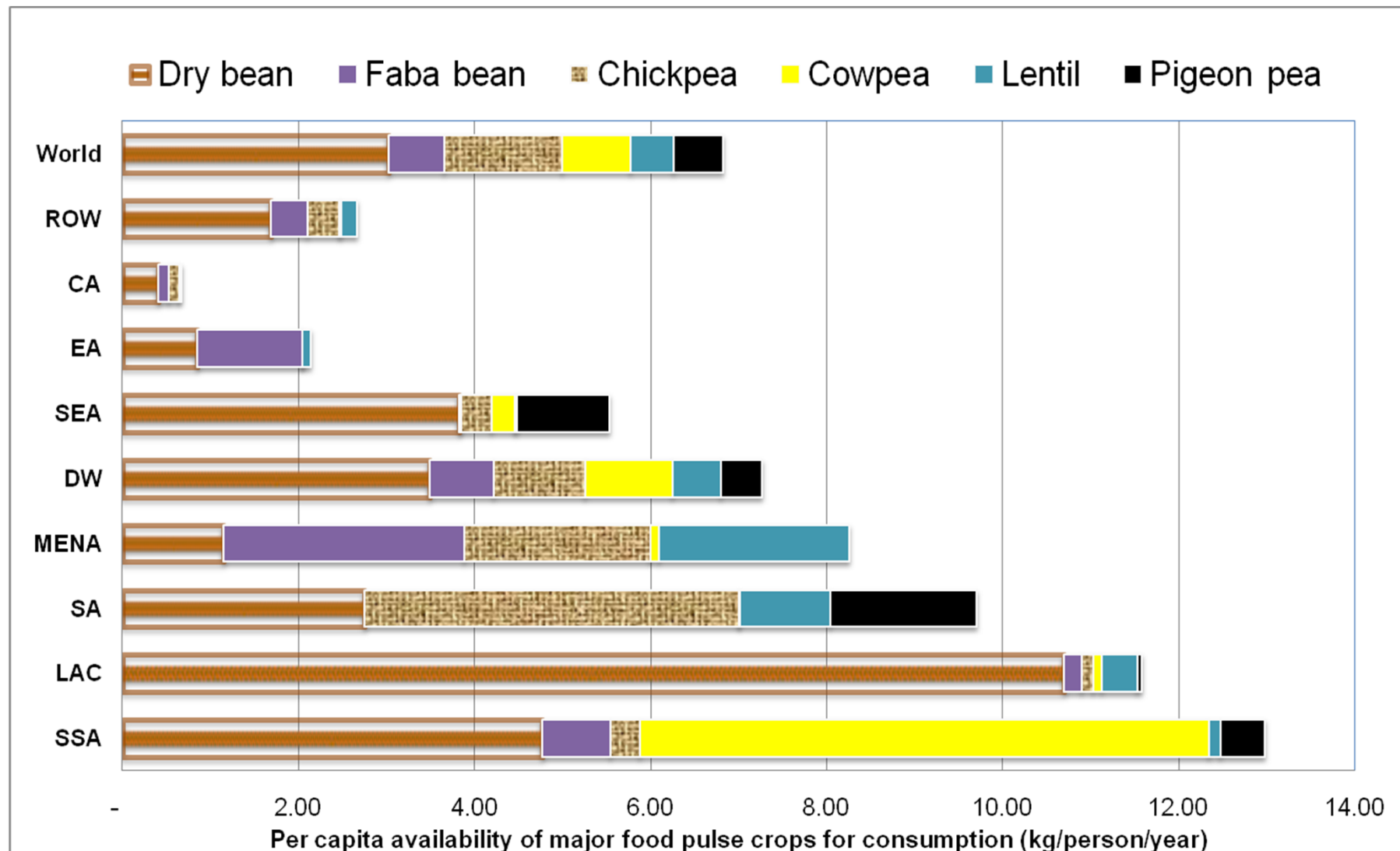


# Historical view of per capita production and consumption of pulse crops globally

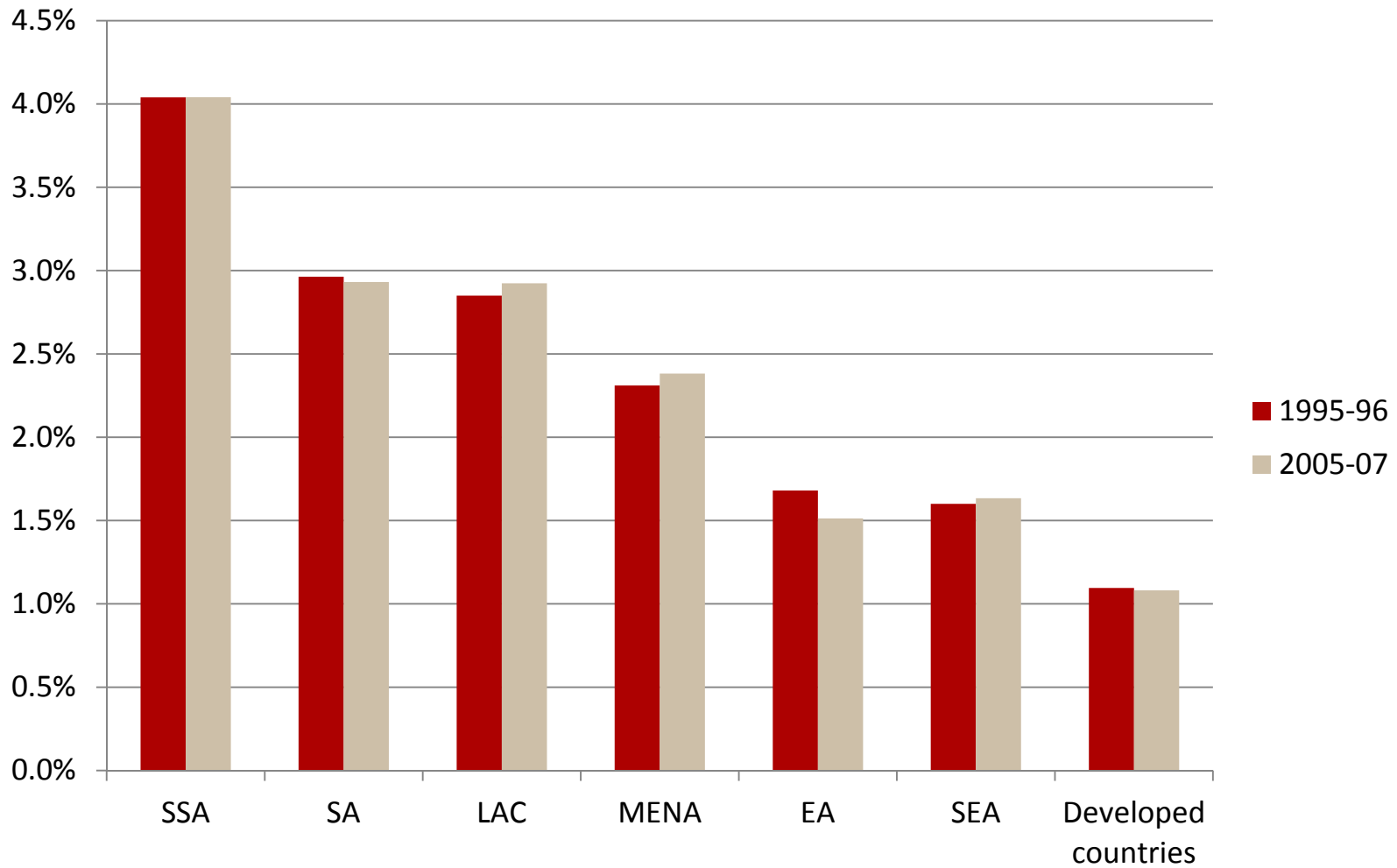


Source: FAO

# Per capita net availability of major food pulses for consumption by regions, 2006-08

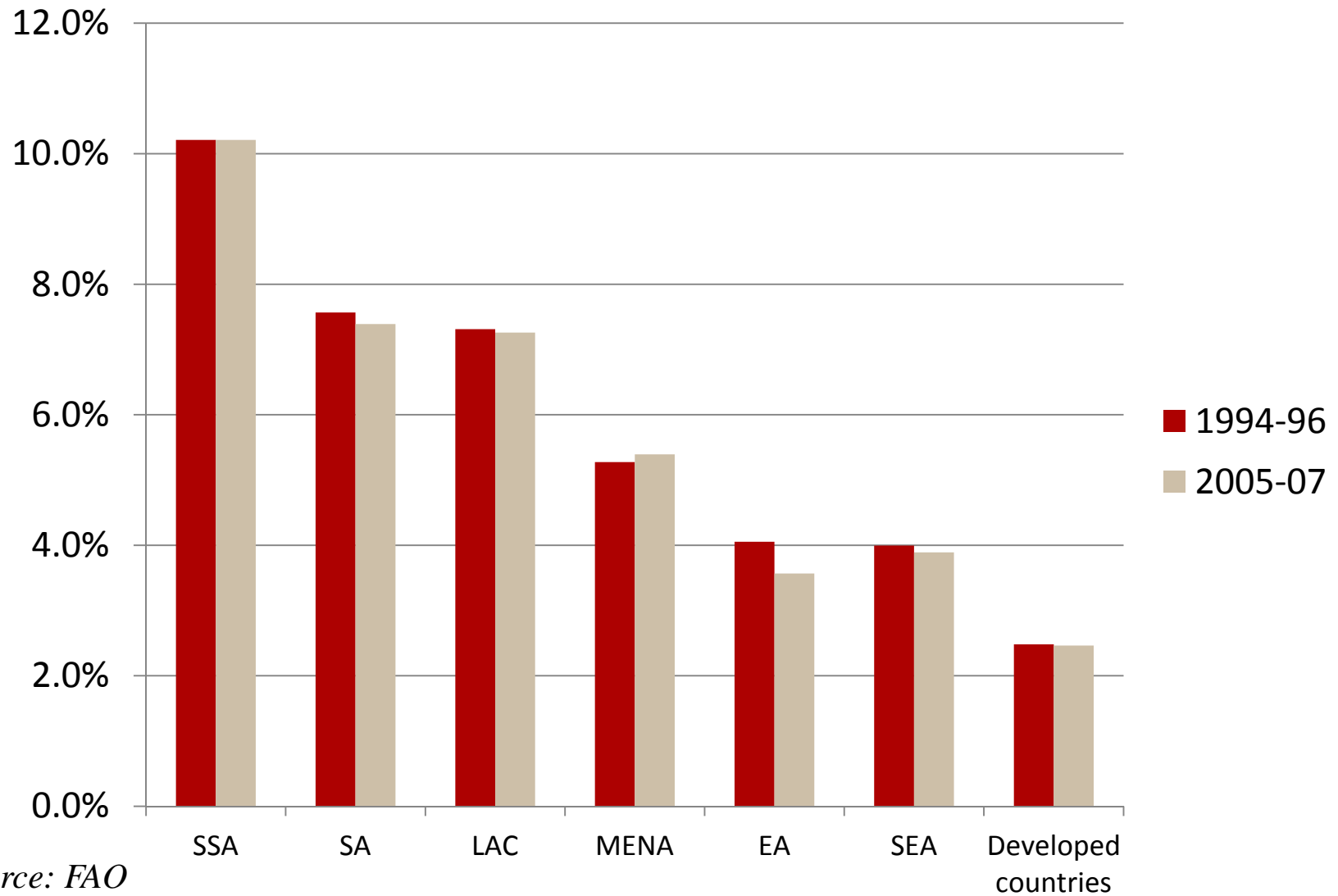


# Pulse grains contribution to total calorie intake in different regions, 1994-96 and 2005-07



Source: FAO

# Pulse grains contribution to total protein intake in different regions, 1994-96 and 2005-07



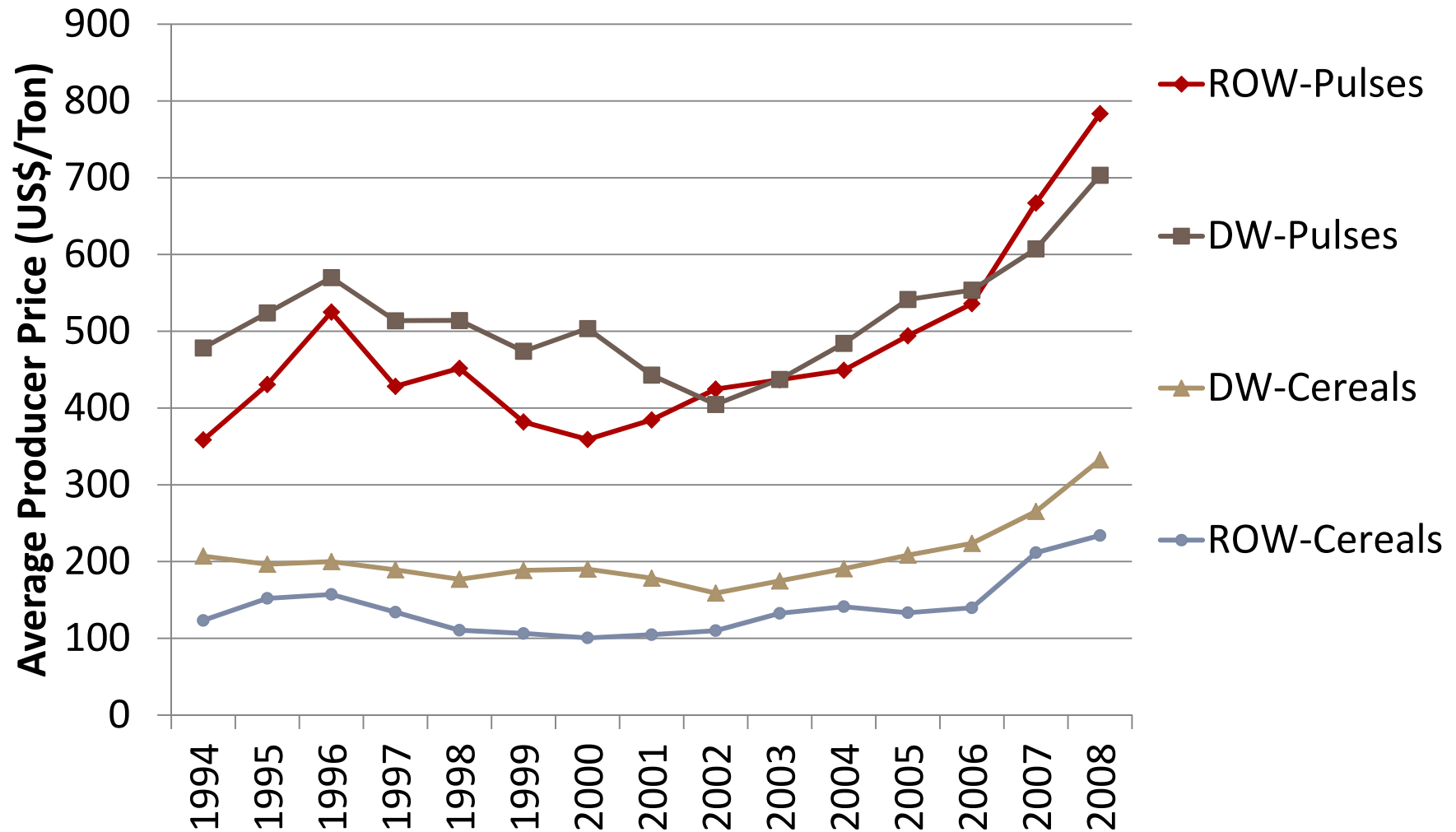
Source: FAO

## Developing countries where pulses contribute more than 10% of per capita total protein intake

Burundi	55%	Nicaragua	16%	Mauritania	13%	D. R. Korea	11%
Rwanda	38%	Cuba	16%	Sierra Leone	13%	Guatemala	11%
Uganda	20%	Niger	15%	India	13%	Mexico	10%
Kenya	20%	Ethiopia	15%	Brazil	13%	Togo	10%
Comoros	18%	Malawi	15%	Trinidad and Tobago	12%	Belize	10%
Haiti	18%	Angola	15%	Mozambique	12%	Paraguay	10%
Eritrea	18%	Tanzania	14%	Cameroon	12%	Botswana	10%

Source: FAO (data for 2005-07)

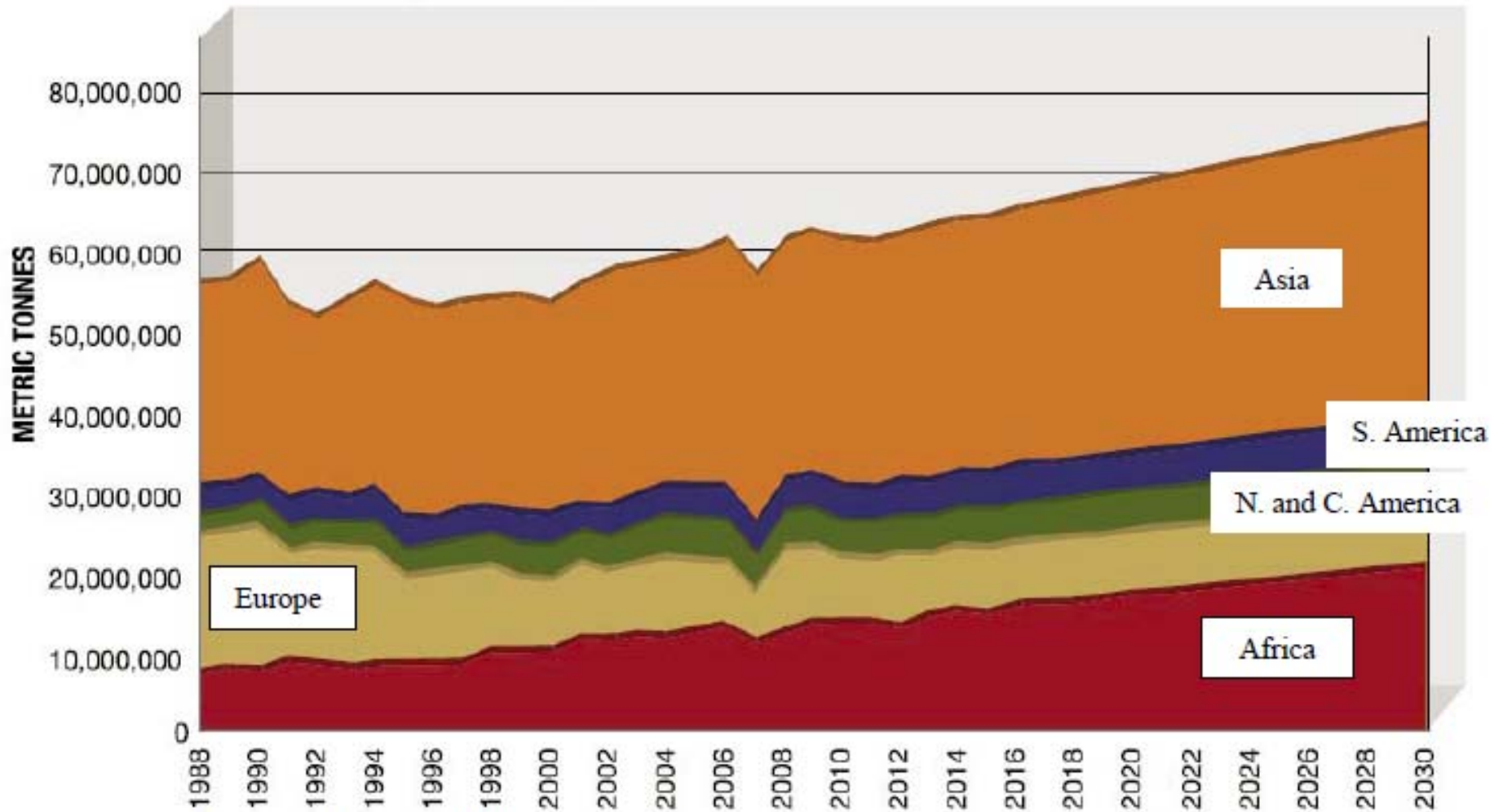
# Trend in Producer Prices – Pulses vs. Cereals in developing and developed countries



DW=Developing world; ROW= Rest of the World (i.e. developed countries)

Source: FAO PriceSTAT

# Future outlook for grain legume crop consumption



Source: Clancey 2009

# In Summary, what do the data indicate?

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- ❑ Total area harvested for pulse crops in developing countries is at par with maize and wheat
- ❑ Compared to cereal crops, pulse crops have not received the same attention and production resources at the farm level
- ❑ Yields have increased modestly over the past few decades (<1%/year)
- ❑ Production per capita has steadily declined
- ❑ Consumption per capita has declined—but appears to have stabilized in recent years



## In Summary, what do the data indicate? (cont'd)

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- ❑ Grain pulses, on average, contribute 2-4% to total dietary calories in developing countries, and
- ❑ Contribute an average 4-10% to total protein intake
- ❑ But in many poor countries in Africa, Asia and LAC the protein contribution is 10-50%
- ❑ Pulse crops are 2-3 times more expensive than cereal crops
- ❑ The producer price of pulse crops has almost doubled in the last 10 years
- ❑ Consumption of pulse crops is projected to increase in the next 10-20 years



# Looking towards the future...

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- ❑ What are the challenges and how can we design impactful research?
- ❑ What should guide the research strategy on dry grain pulses such that it contributes towards FTF goals of reducing poverty and hunger?

# Designing impactful research

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Begins with:

- ❑ Defining and understanding the target population – i.e., the beneficiaries of our research
  - Who they are?
  - Where they are?
  - What are their characteristics (socio-economic and production systems in which they operate)?
  - What resources they have and what are their constraints?

**Remember, the FTF goals are ‘people’ focused...and so should the research we do**

# Prevalence of poverty and malnourishment in small holder based farming systems in major pulse producing and consuming regions

Region	Area planted to grain pulses m ha	Prevalence of [...] in smallholder based farming systems	
		Stunting	Poverty (<\$1/day)
	million people		
LAC	7	5	45
SSA	18	24	206
S and SE Asia	31	62	443

*Source: FAO for Area; CRP 3.5 Proposal for Stunting and poverty data.  
Data circa late 2000s*

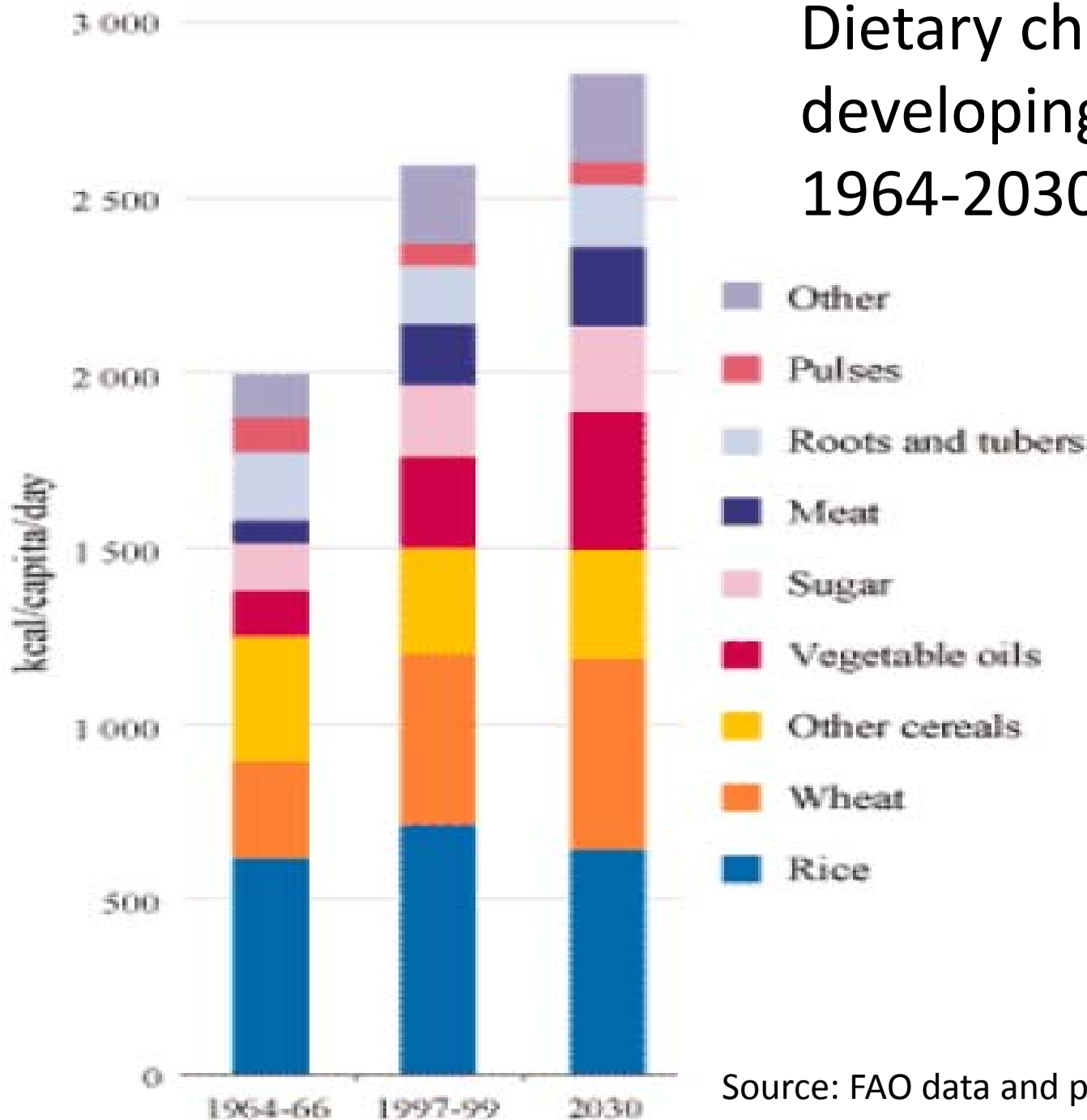
# Designing impactful research (cont'd)

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Means:

- ❑ Designing research to address the challenges to come...rather than challenges of the past
  - Anticipate the demand for knowledge, information and technology to address projected problems and constraints
- ❑ Identifying researchable questions that will contribute to the **welfare** of the target population (even though there may be uncertainty in the time frame to reach that goal)

# Dietary changes in developing countries, 1964-2030



Source: FAO data and projections



# How can pulse crop research contribute towards FTF goals?

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- ❑ **By increasing the productivity of the farming systems** in which pulse crops are produced
  - Develop new technologies that will substantially increase output and income per unit of agricultural land owned by a household rather than from area planted to pulse crops (cereal-based systems; livestock-based systems)
- ❑ By generating technologies, information and institutional innovations that will **reduce the costs along the Pulse value chains** from farm-gate to fork
  - This should lower the price to consumers and thus increase demand and consumption of pulse crops

# How can pulse crop research contribute towards FTF goals?

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- ❑ By **exploiting the diverse roles pulse crops** play in the food system
  - Develop pulse crop technologies that will lead to increased consumption of nutritious food – not just consumption of pulse crops (i.e. recognize the indirect role pulse crops play in enhancing the consumption of nutrition rich animal-based foods)
  - Develop technologies that will allow households utilize different stages of legume crop as food in critical ‘hunger period’
- ❑ By **generating credible evidence** on the benefits of a diet rich in legume based foods to influence policy decisions



# As we discuss our research strategy, let's keep in mind our research clientele

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## 1. They are smallholder farmers

- Many are poor (living on <\$1/day)
- Are resource constraints (own 1-2 ha of land)
- Have limited productive assets
- Are net buyers of food

# Profile of an 'average' pulse grower in a developing country

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- Farm size: **~2 ha**
- Area devoted to a pulse crop: **~1 ha**
- Pulse production/year: **700 kg**
- Value of production (@\$700/ton): **\$420**
- Gross margins (assuming 50% cost/revenue): **\$210**
- Size of household: **6**
- Value generated per person per day from pulse crop: **10 cents**

# Let's keep in mind our research clientele

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## 2. They are poor consumers

- Living in rural and urban areas
- Cannot afford food if the price is high
- Lack education, information and income to make healthy dietary decisions
- Face lifestyle issues (esp. urban consumers) that leads of abandoning traditional pulse-based foods

## 3. As producers and consumers, they represent the vulnerable segment of population (poor, women, children and sick), and

- Lack empowerment to make decisions that serve their interest

# As we discuss research objectives and set targets, let's challenge ourselves

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- How will the research impact the welfare of a large numbers of our clientele groups, such that it will lead to
- Reduction in poverty, hunger and malnutrition



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**THANK YOU FOR YOUR ATTENTION**

Comments/questions welcome