

Water Footprints of Milk

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Water Footprints of Milk

Outline

- What are water footprints?
- Why milk water footprints?
- Water for milk production – some examples
- Sustainable milk production – some approaches



What are water footprints?

- what we hear everyday are water footprints of different products



1,800 liters per 1 kg of wheat



2,500 liters per 1 kg of rice

15,400 liters per 1 kg of beef







1,000 liter per one liter of milk



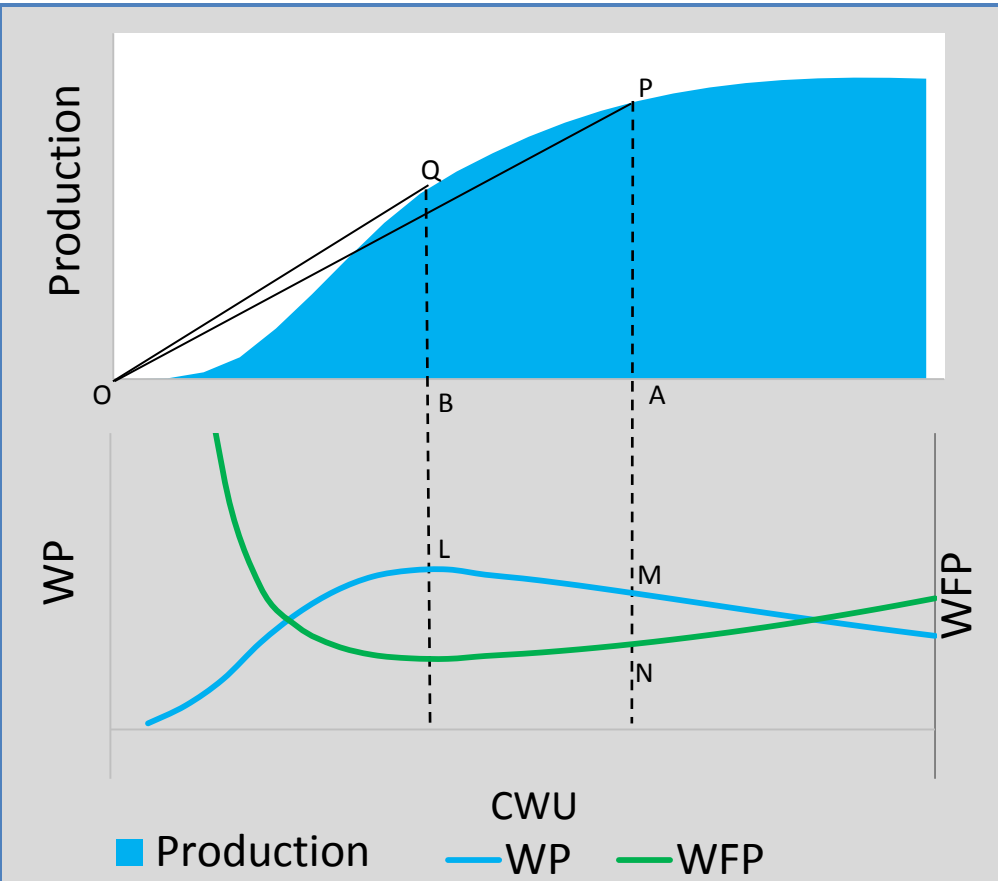
What we hear everyday--

Water footprints of products in different countries

Product	M ³ per 1000 Kcal	M ³ of water for daily consumption		
		Asia	South Asia	India
	679	528	485	468
	589	311	311	284
	1,443	101	127	119
	8,800	185	108	62

What are water footprints?

- Consumptive water use (CWU) in the production process



Water productivity (WP) = AP/OA

Water footprints (WFP) = OA/AP

$$WFP = 1 / WP$$

Eg. WP of a product

$$WP = 0.5 \text{ kg/m}^3$$

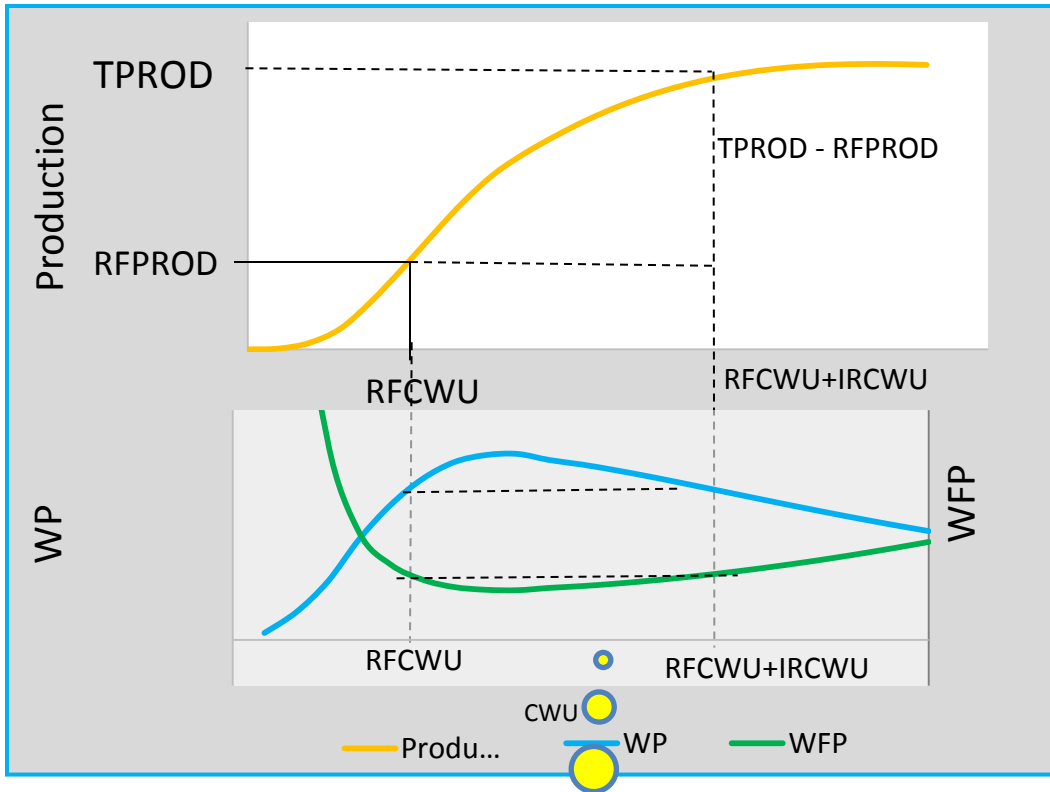
$$WFP = 2 \text{ m}^3/\text{kg} = 2000 \text{ m}^3/\text{ton}$$



Water footprints components

- Green and Irrigation WFP

- **Green WFP** = (rainfall CWU / production)
- **Blue WFP** = (irrigation CWU / production)
- There are issues with green and irrigation WFP, especially with the denominator
- Not all rainfall CWU contributes to total production, except in rainfed areas
- Not all irrigation CWU contributes to total production, except in completely irrigated areas



Need care when reporting green and blue WFP

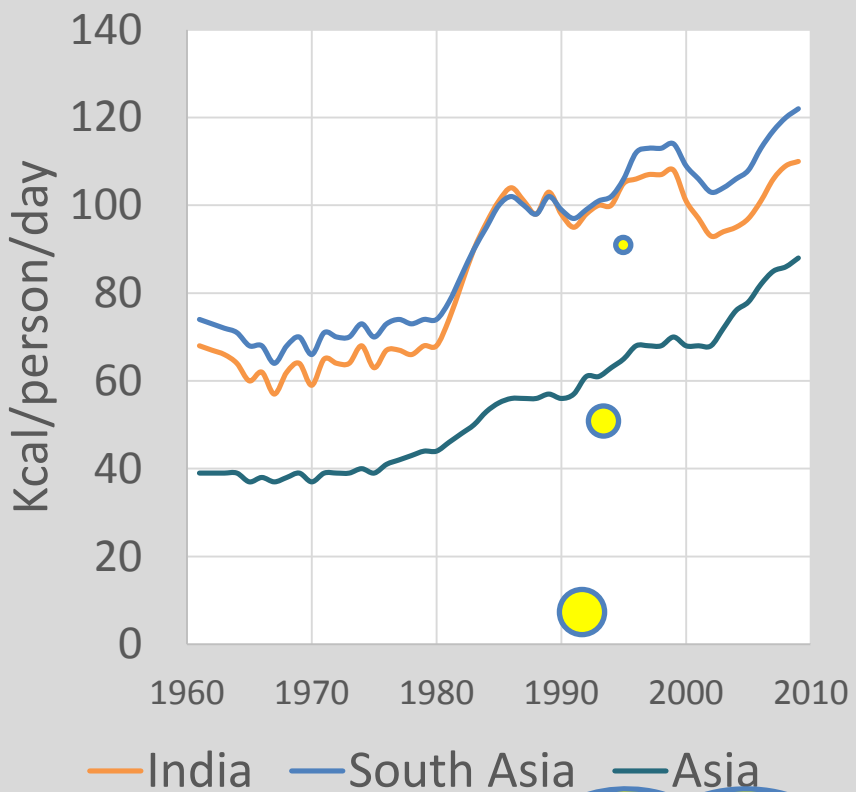
WFP of Crops and milk – Direct and indirect water use

WFP		Direct water use	+	Indirect water use
$WFP_{Milk} =$	Green =	na	+	CWU from soil moisture in fodder and other feed crops
	Irrigation =	Drinking/servicing of animals	+	CWU from irrigation in fodder and other feed crops
	Grey =	na	+	Water pollution through input use or in by products
$WFP_{Crop} =$	Green =	CWU from soil moisture in crop production	+	na
	Irrigation =	CWU from irrigation water in crop production	+	na
	Grey =	Water pollution from input use or in byproducts	+	na



Why water for milk is important fro Asia?

Calorie supply from milk



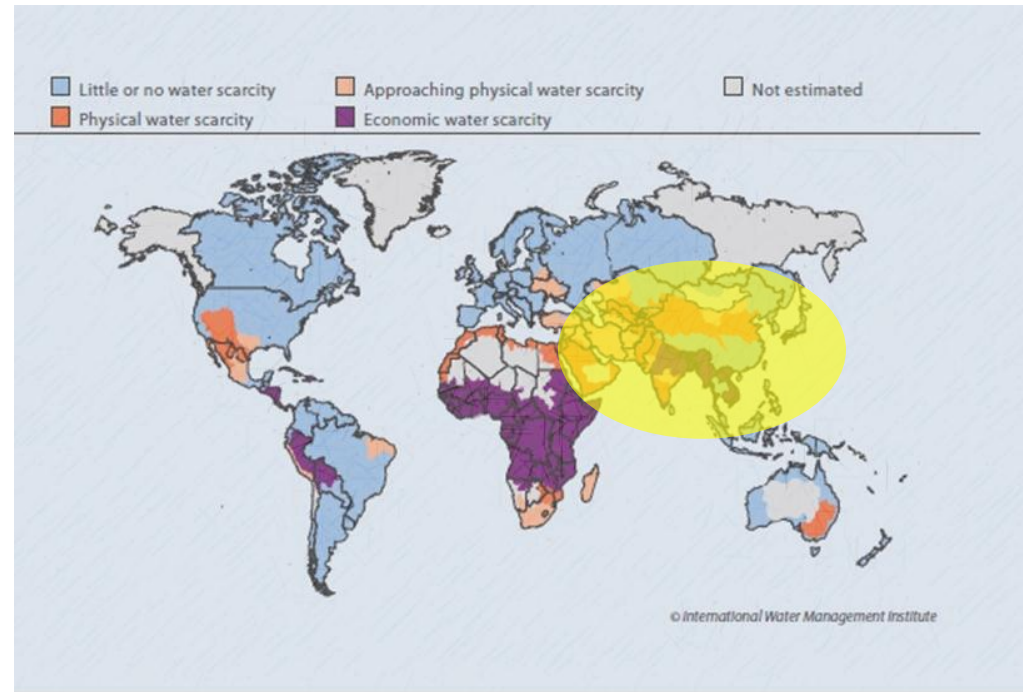
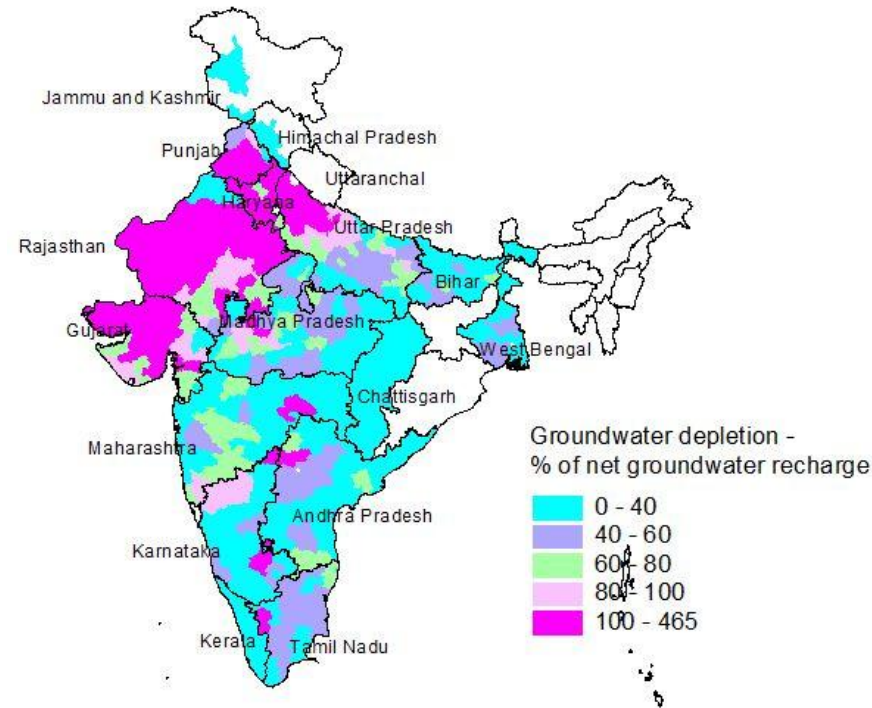
Milk consumption is increasing rapidly

Milk production

Region/country	Production (M Tonnes)	% of total
Asia	280	
South Asia	178	64%
India	125	45%
Pakistan	38	14%

South Asia contributes to 2/3 of the production

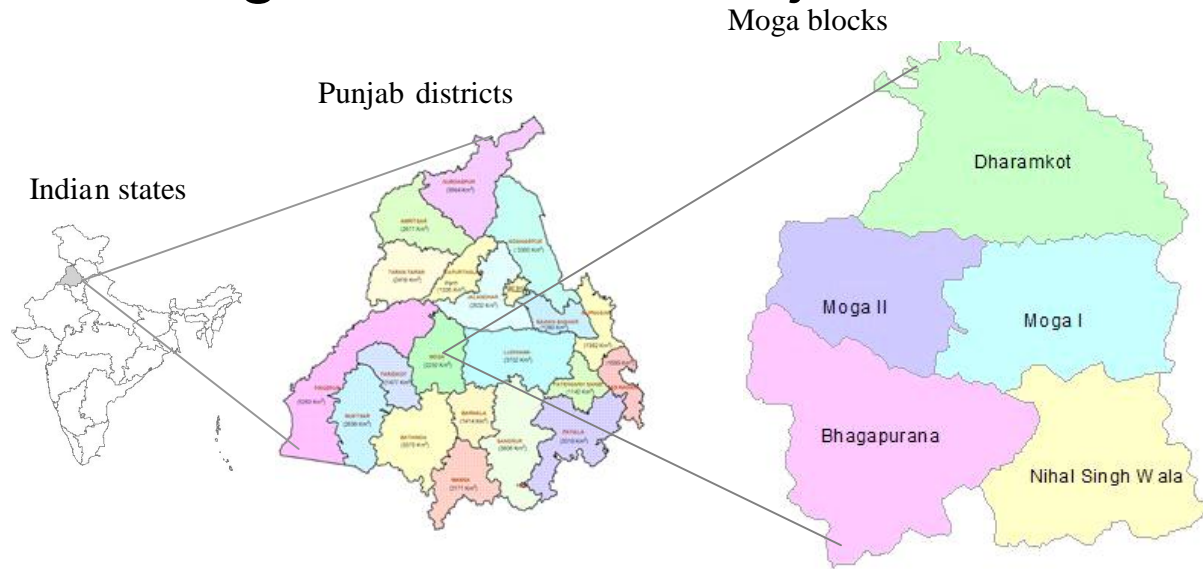
Why water for milk is important?



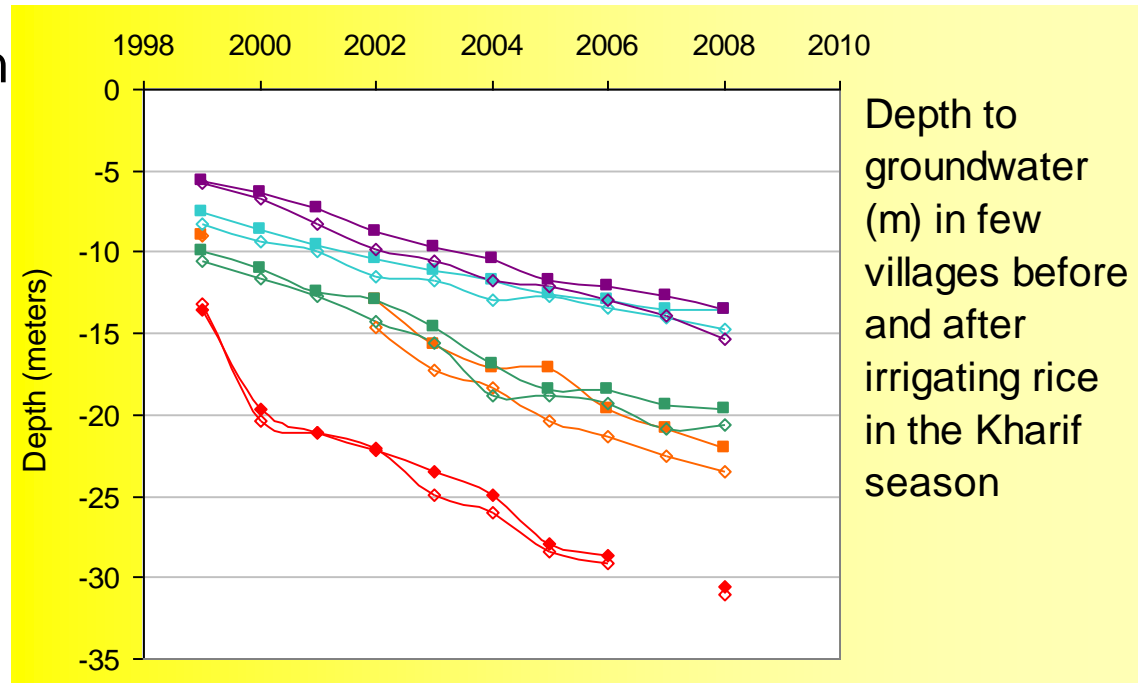
Major milk producing areas:

- under severe water stress and
- unsustainable groundwater use
- high poverty
- milk production is a substantial part of the income

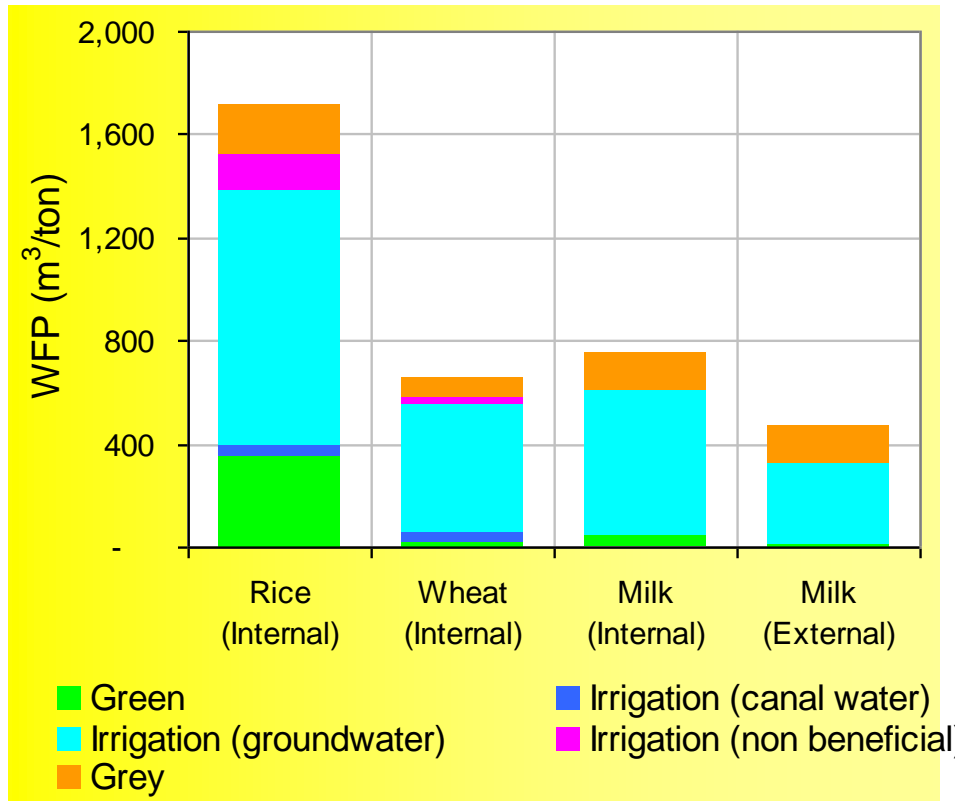
WFP Examples - Moga district in Punjab, India



- Rapid groundwater depletion
- Substantial crop and milk production depends on unsustainable GW exploitation



WFP Examples” Moga district in Punjab, India

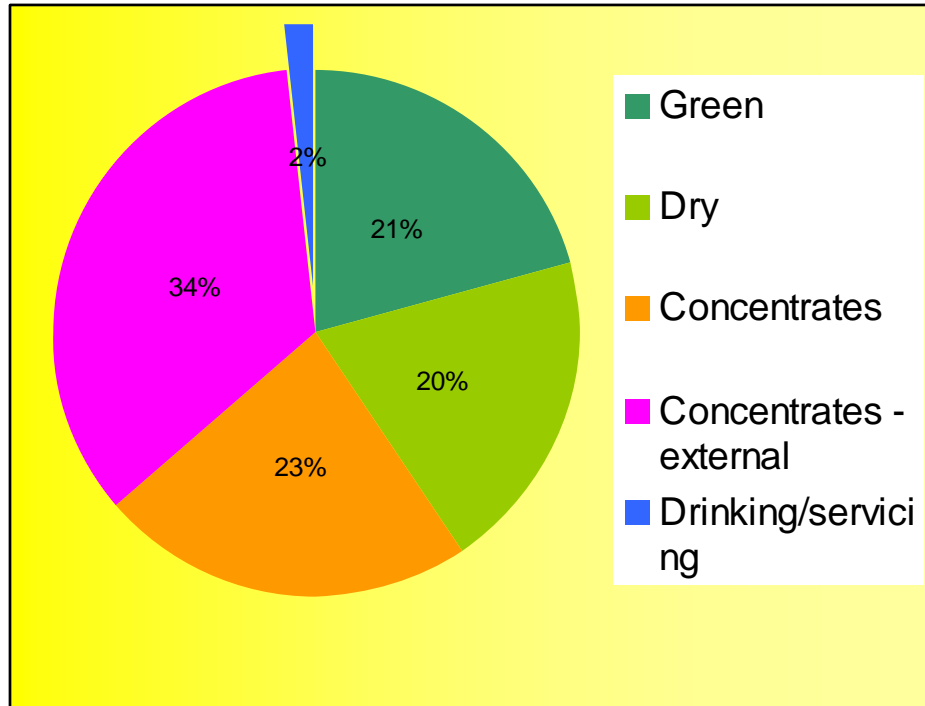


Water footprints

- Rice - 1,870 m³/ton
- Milk- 940 m³/ton
- Wheat- 554 m³/ton
- Contribution from external water footprints to milk production is 37%

Commodity	Water Footprint (m3/ton)			
	Green	Irrigation		Grey
		Canal	Groundwater	
Milk	58	-	882 (94%)	143
Wheat	17	42	495 (90%)	74
Rice	346	50	984 (71%)	195

WFP Examples” Moga district in Punjab, India



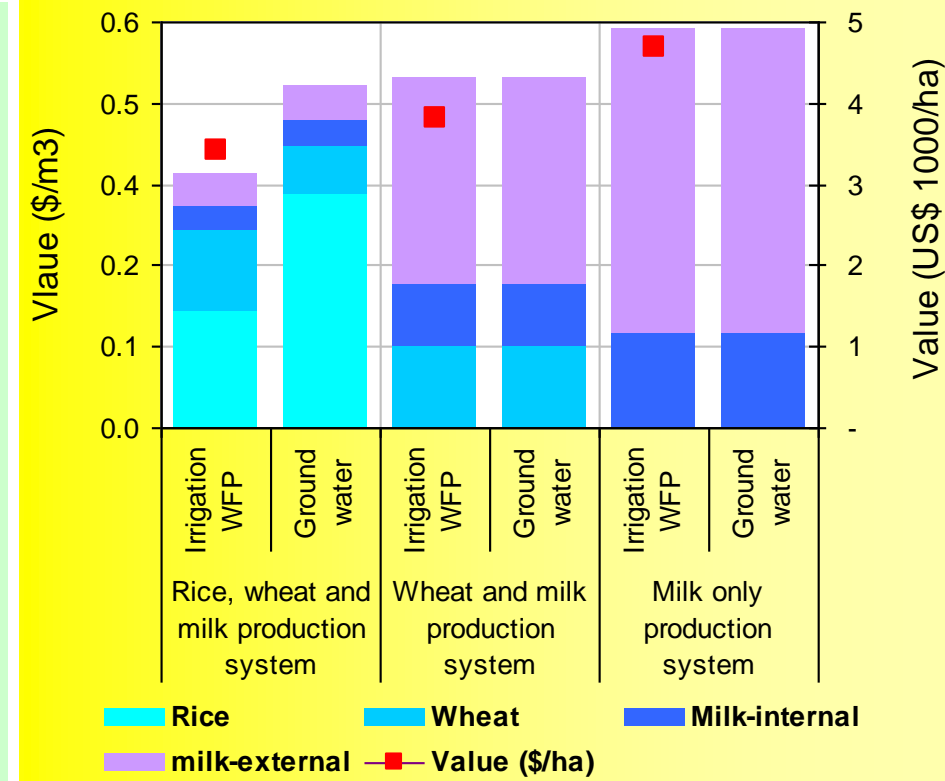
Water footprints of milk

- Green fodder - 196 m³/ton
- Dry fodder – 184 m³/ton
- Concentrates – internal – 218 m³/ton
- Concentrates – External - 327 m³/ton
- Drinking/bathing – 15 m³/ton

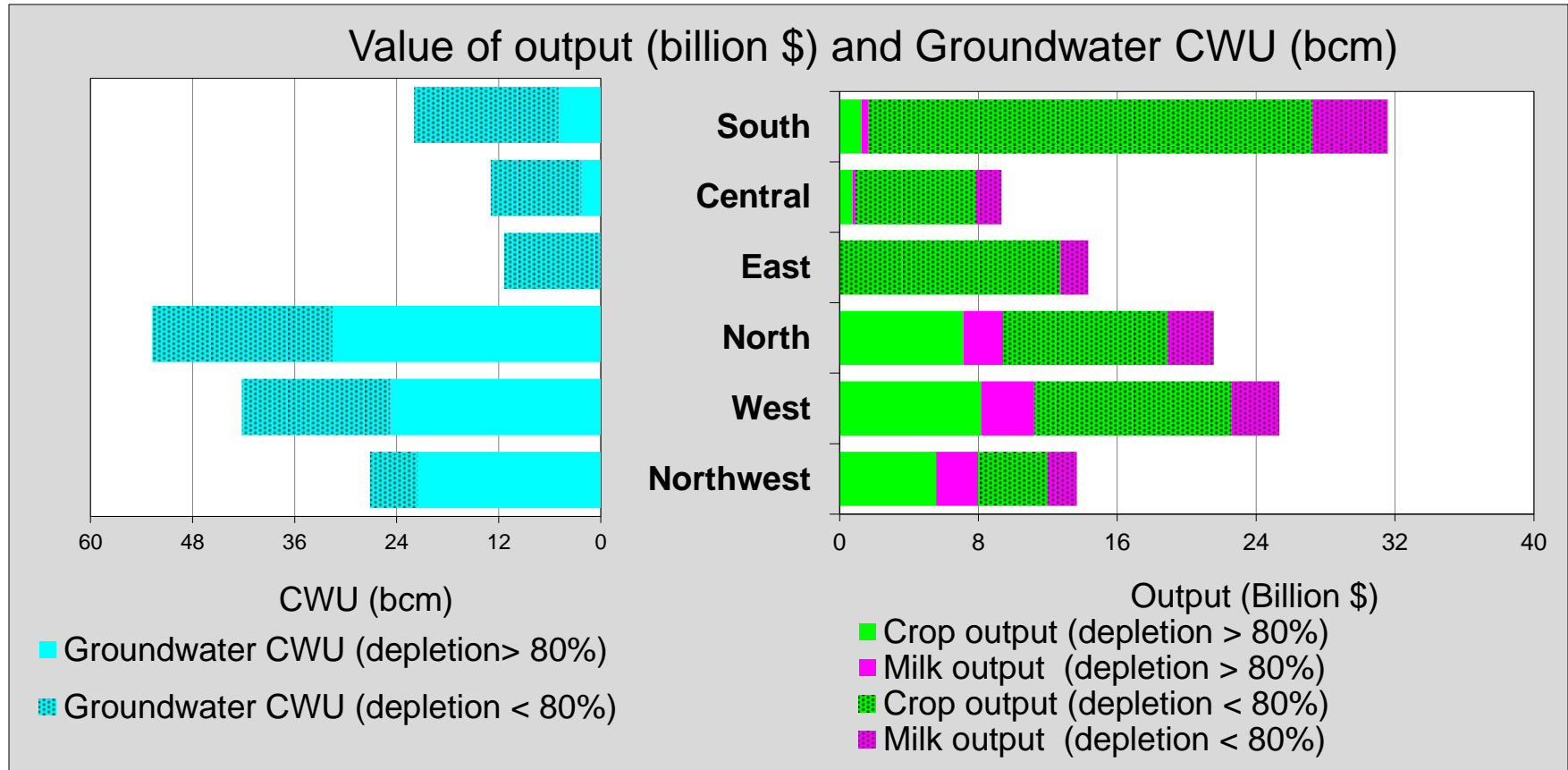


Impact of GW WFP in Moga

- Value of output per unit of net irrigated area
 - US\$ 4,221/ha in Milk only
 - US\$ 3433/ha in milk-wheat
 - US\$ 3081/ha in milk-wheat-rice
- High dependency of milk only outputs from virtual water
- Have more milk dominated production system



WFP Examples: All India groundwater CWU of crop and milk production



Sustainable Dairy - Approaches

- Dairy intensive production systems with less rice area offer the most financial and hydrological benefits
 - Eg. Wheat and milk or milk only
- Import feed from low CWU areas
 - Increase virtual water imports
- Have more crossbred cows
 - Higher milk yield, but high maintenance cost
 - Yet, more value and less CWU
 - More studies to understand the optimum combination

Water Footprints of Milk

Thank you

