YUMA AGRICULTURE WATER CONFERENCE

Yuma's Agriculture Water: What You Need To Know

January 13, 2016

# Economic Perspectives on Yuma Agricultural Water Use

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COOPERATIVE EXTENSION

# Today

- Myths & Facts about agricultural water use
- Opportunity Costs
- Health Production Functions

# **Myth 1**: Cotton programs & production are a large contributor to current water problems

## Facts:

- Starting with 1985 Farm Bill, cotton programs have increasingly decoupled support from water use decisions
- Over past 30 years, water applied to produce cotton in AZ, CA, & NM has declined by 70%
- This reduction in water use is equivalent to two-thirds of all residential water use in AZ, CA, & NM

# **Myth 2**: AZ durum wheat has a much larger water footprint* than wheat production elsewhere

## Facts:

- Popular water footprint calculators do not accurately account for local rainfall & cropping patterns

- Accounting for errors in footprint calculators & higher yields in AZ production, AZ durum wheat production has a **much lower** water footprint that most production regions

* A water footprint is the amount of water consumed to produce a bushel of wheat

# **Myth 3**: A lot of water is "exported" from AZ in the form of alfalfa exports

## Facts:

- The main use of alfalfa is to feed **local** milk cows for **local** dairy production.
- Only about 3.5% of US hay is exported
- Dairy products typically travel less than a day to market
  Giovannucci, et al. (2010) "Defining and Marketing 'Local' Foods: Geographical Indications for U.S. Products," Journal of World Intellectual Property." Vol. 13.

# Opportunity Cost

- **Definition**: The cost of an alternative that must be forgone in order to pursue a certain action. Put another way, the benefits you could have received by taking an alternative action.

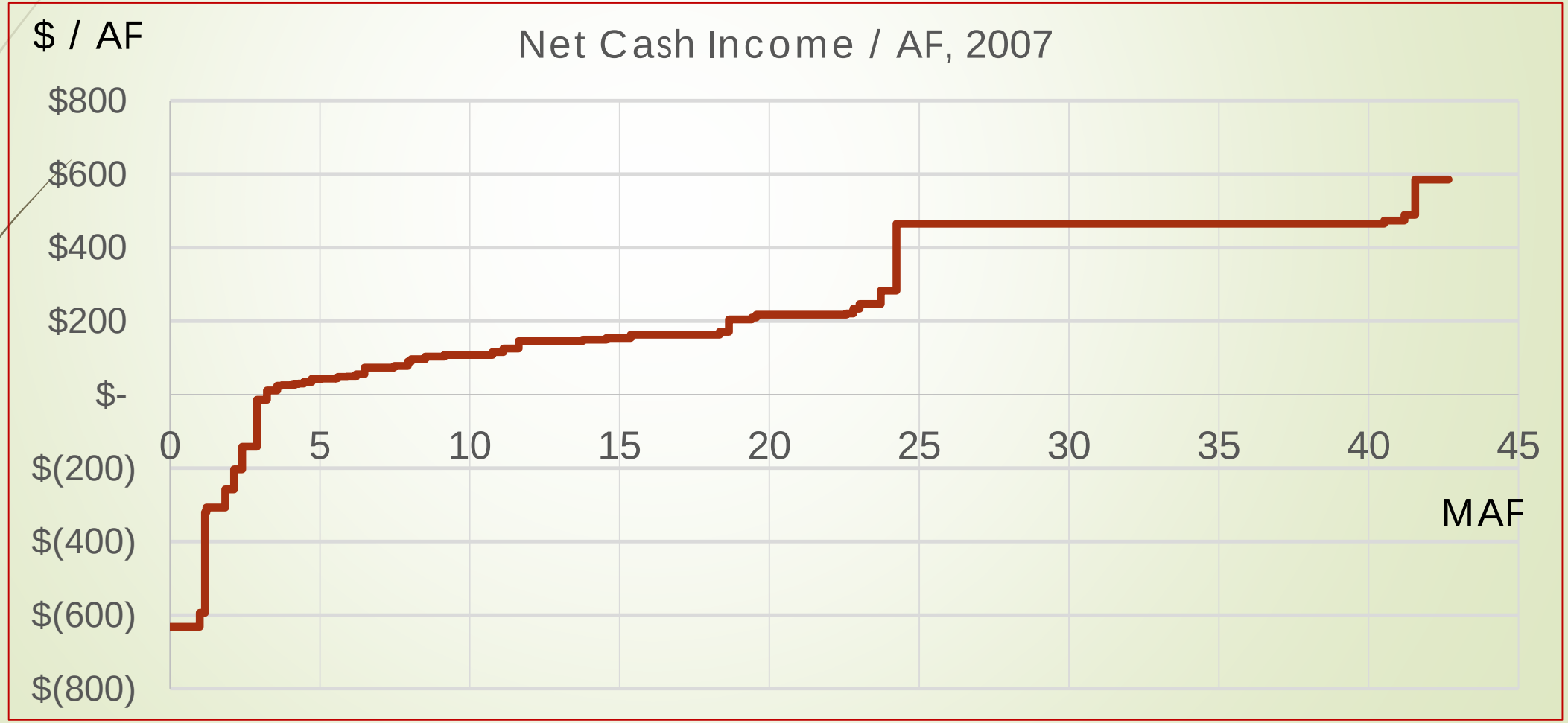
- There is an **opportunity cost** of transferring water away from agricultural production to other uses related to the value of foregone production.

# Opportunity Costs of Transferring Water from Yuma Will Be Relatively High

- Because Yuma agriculture is relatively productive and profitable, the foregone benefits of agricultural production will be greater

- Costs will also be higher because
  - agriculture & related industries are such a large share of the local economy
  - directly & indirectly support 1 in 4 county jobs

# Net Income / Acre-foot of Water Applied
# 7 Basin States, 2007



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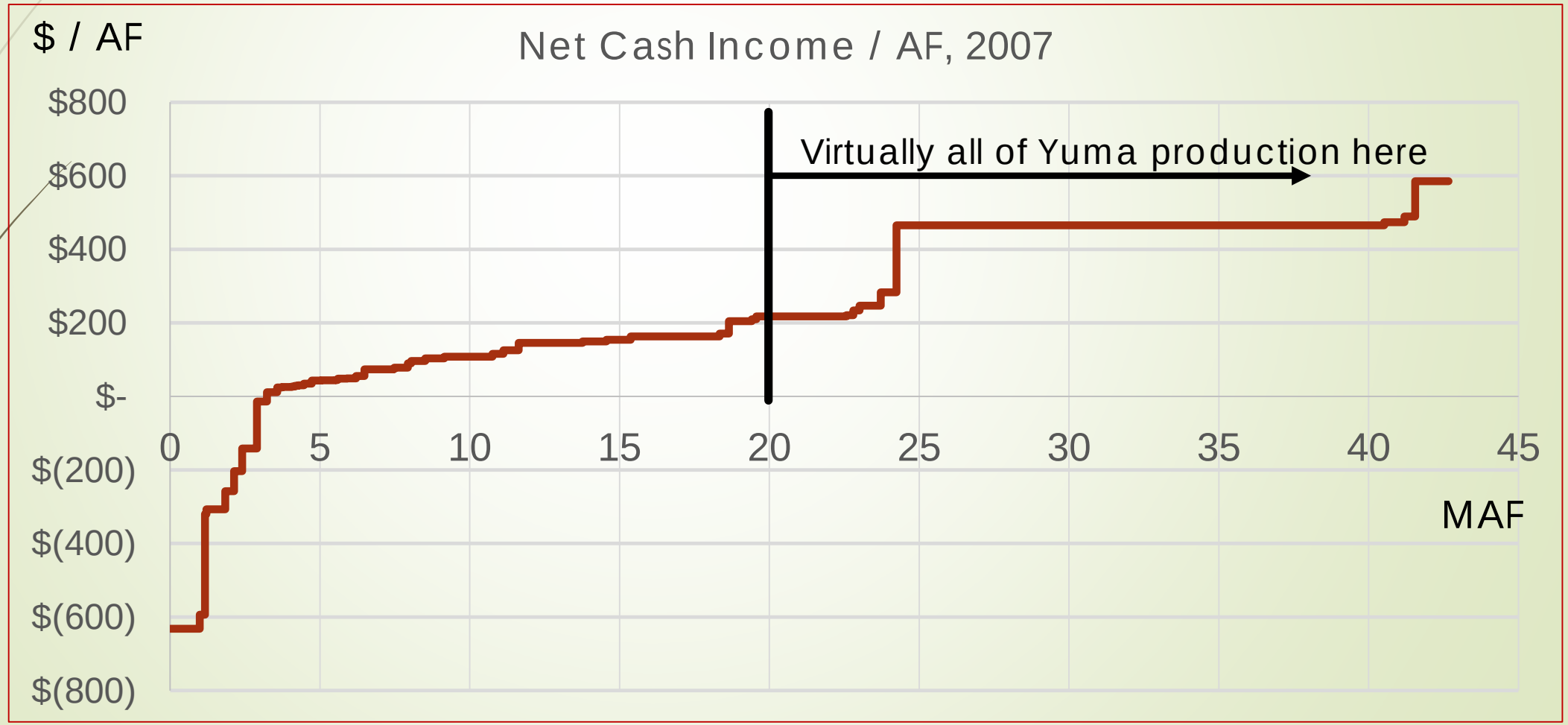
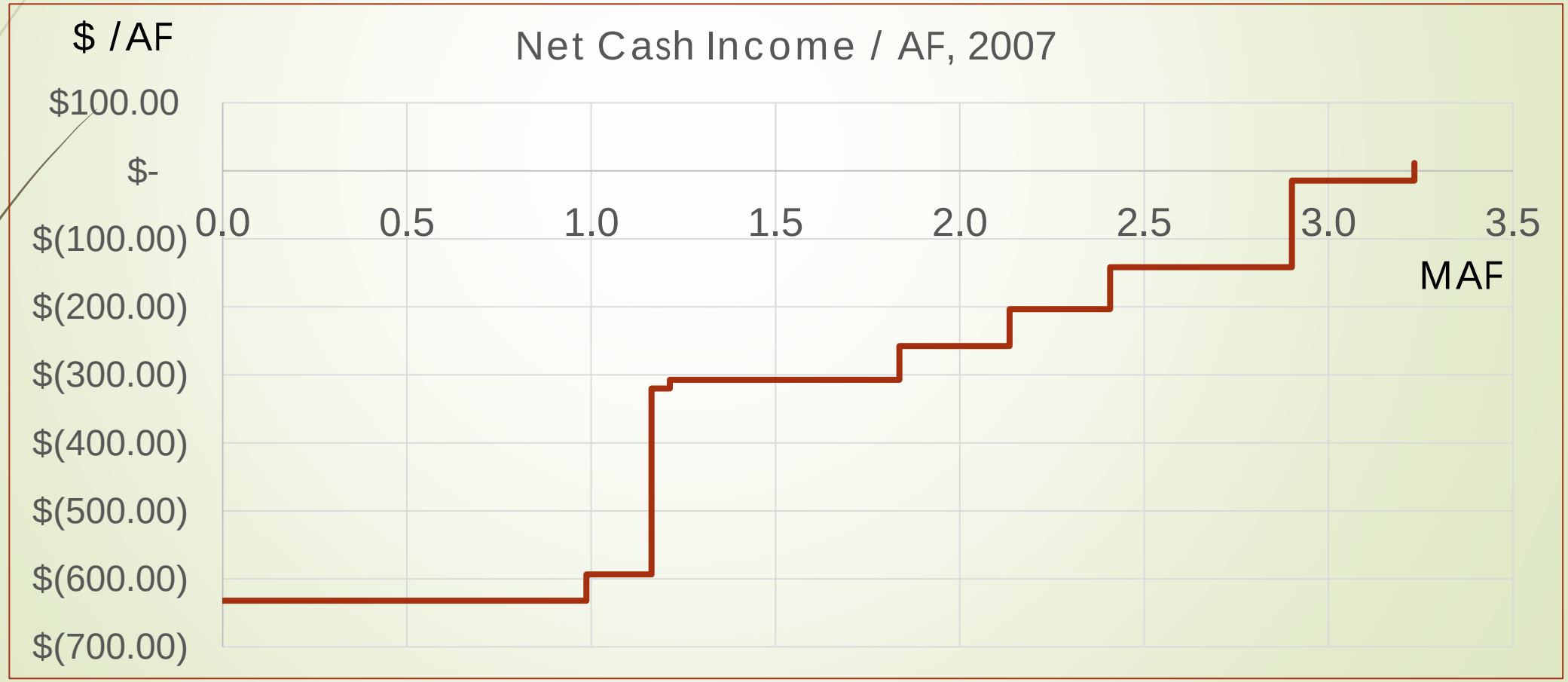
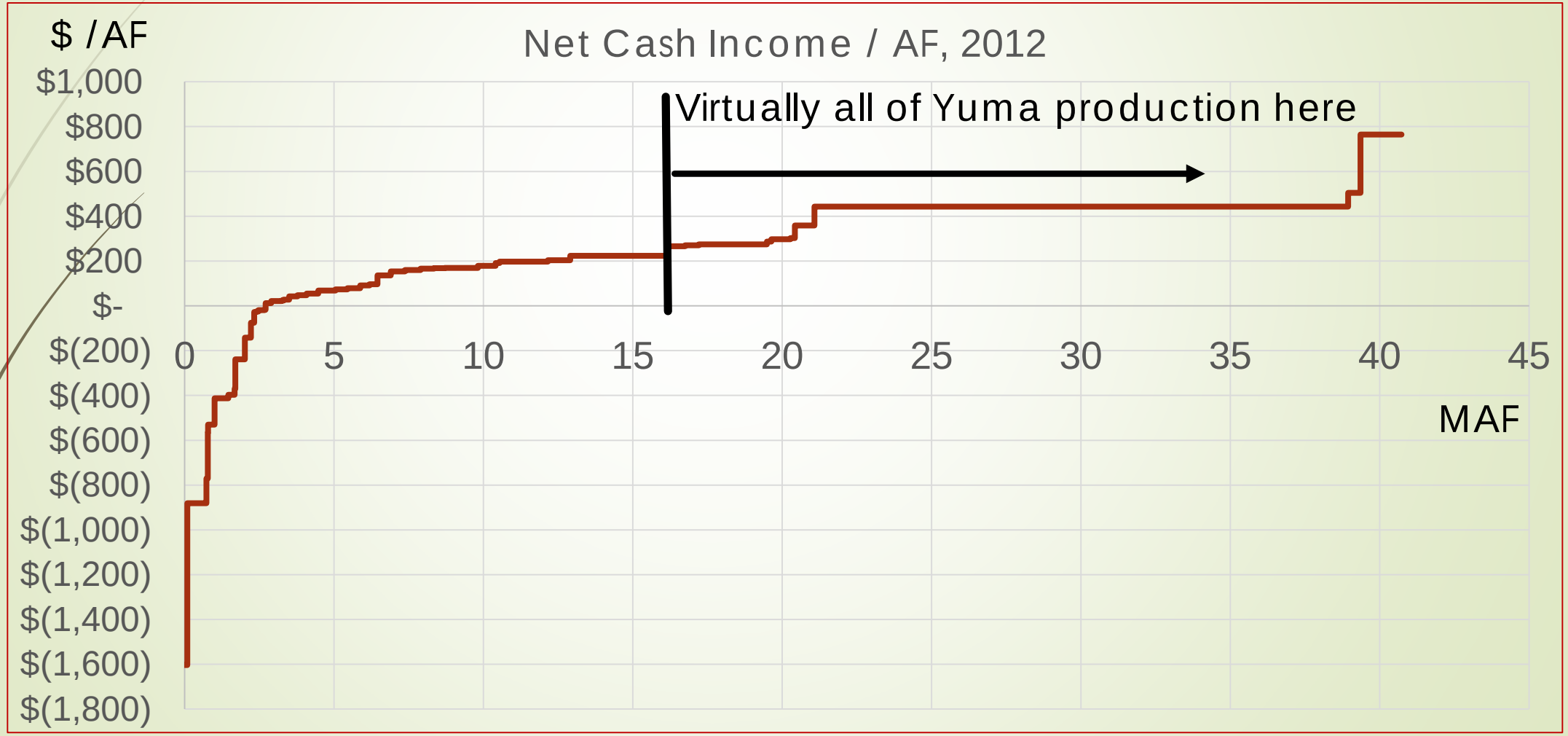


# Farms in 7 Basin States with Negative Net Income AF, 2007



# Net Income / Acre-foot of Water Applied
# 7 Basin States, 2012



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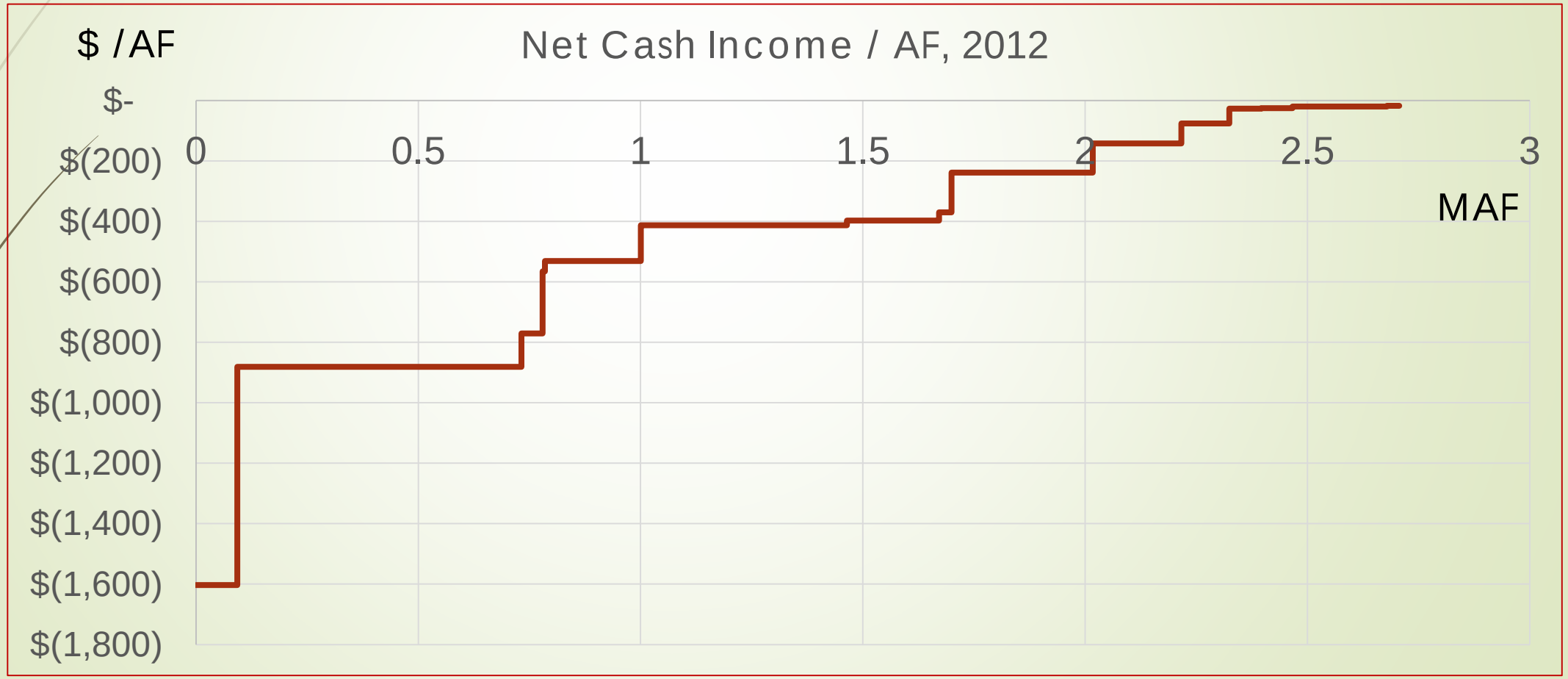

# So What?

- Between 2 most recent Ag Censuses, irrigation applications in 7 Basin States fell by > 1 MAF
- Most of the reductions came from the least profitable operations
- In terms of the costs to society of foregone agricultural production, Yuma agriculture is an expensive source of water for transfers

# Health Production Functions

- Agricultural production function: Output depends on
  - Inputs (land, labor, water, fertilizer, fuel, & other inputs)
  - External factors (weather, pest infestations, etc.)

- Health production functions: Health (or absence of disease) depends on
  - **Diet**
  - Exercise
  - External factors (genetics, accidents, etc.)

# Food is a critical **input** in the production of health

- Alfalfa → Dairy Products → Bone Health → Fracture Prevention
- Fruits & Vegetables → Multiple Health Benefits

# Economic burden of disease is enormous

- Costs of osteoporosis-related fractures in AZ
  - >$270 million in 2005
  - projected to rise to $459 million / year by 2025

King, et al. (2009). Interstate variation in the burden of fragility fractures. *Journal of Bone and Mineral Research*, *24*, 681-692.

# Dairy product intake a cost effective means to reduce disease burden

- **Source** Ethgen, et al. (2015). Public health impact and cost-effectiveness of dairy products supplemented with vitamin D in prevention of osteoporotic fractures. *Archives of Public Health*, *73,* 1-7.

- **Results** "daily intake of vitamin-D rich dairy products reduces by 30,376 and 16,105 events the number of osteoporotic fractures in women and men … and permits to gain 6605 and 6144 life-years, in women and men"

- **Conclusion** "The recommendation to use dairy products as the preferred source of calcium and vitamin D in aging males and females is supported by public health and health economic analyses."

# Sahni, et al. (2014). Protective association of milk intake on the risk of hip fracture …. *Journal of Bone and Mineral Research*, *29*, 1756-1762.

- There appeared to be a threshold for milk, with 40% lower risk of hip fracture among those with medium/high milk intake compared with those with low intake …. A similar threshold was observed for milk + yogurt intake”

- “In 2004, McCarron and Heaney reported …an estimated 5-year savings in healthcare cost of $14 billion for treating osteoporotic fractures in the United States if the recommended intake of dairy products (3 servings per day) was met.”

- “Our current study contributes to the body of scientific information supporting a beneficial effect of dairy intake on hip fracture risk among older adults.”

# Boeing, et al. (2012). Critical review: **vegetables and fruit** in the prevention of chronic diseases. European journal of nutrition, 51, 637-663.

- "For hypertension, CHD, and stroke, there is convincing evidence that increasing the consumption of vegetables and fruit reduces the risk of disease."

- "There is probable evidence that the risk of cancer in general is inversely associated with the consumption of vegetables and fruit."

- "there is possible evidence that an increased consumption of vegetables and fruit may prevent body weight gain. As overweight is the most important risk factor for type 2 diabetes mellitus, an increased consumption of vegetables and fruit therefore might indirectly reduces the incidence of type 2 diabetes mellitus."

# Costs of Diabetes in Arizona

- People with diabetes have medical expenses about 2.3 times higher than those who do not have diabetes.
- Total direct medical expenses for diagnosed and undiagnosed diabetes, prediabetes and gestational diabetes in Arizona was estimated at $4.9 **billion** in 2012.
- Another $1.5 **billion** was spent on indirect costs from lost productivity due to diabetes

Source: American Diabetes Association

# Some costs of coronary heart disease (CHD) & stroke in Arizona

- Hospital charges from heart disease & stroke totaled nearly $4.2 **billion** in 2005
- This does not include costs of nursing homes, physicians, medicines, or lost productivity
- Nationally, these other costs are more than double hospital costs

Source: Arizona Department of Health Services

# Recap

- Several criticisms of agricultural water use are not supported by closer inspection of data
- Costs to society of foregone agricultural production in Yuma are relatively high compared to many other places in the West
- Less profitable operators are already in process of moving out of agriculture
- AZ agricultural commodities have underappreciated, but enormous economic benefits in production of better health

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# Thank you

# Questions?