Managing Manure in California's Central Valley

Jonathan D. Kaplan
Department of Economics
California State University Sacramento

Recent Trends in Concentration of AFOs Places Nutrient Burden on Surrounding Crop and Pasture Lands

Manure Nutrients Applied to Land Often Exceed Assimilative Capacity

Nutrients Ultimately Find Their Way to Water Resources

Federal and State Regulations Limit Land Application of Manure Nutrients

In California

AFOs concentrated in the Tulare and San Joaquin River Basins

70% of Livestock (~28% in Tulare County)
97% of Poultry (~62% in Merced and Stanislaus County)
38% of Egg Production
86% of Hogs (67 % in Tulare County)

In the Central Valley we have an Added Concern

Each Ton of Manure contains ~50-100 lbs of Salt

No Suitable Outlet to Drain Salts from the Tulare Basin and San Joaquin Basin

California's Concentration of AFOs And Limited Cropland and Pastureland Suggests Grave Consequences

Recent Studies Suggest Losses to AFOs in the Billions

Some Suggest Losses of Nearly 50%

Past Studies Did Not Anticipate Structural Change in Cropping Patterns Due to

Change in Corn Demand
Delta Smelt

Large Decline in Available Acreage for Spreading Manure are Expected

Salt Concerns, however, could Eliminate Land Application of Manure in Tulare and San Joaquin Basins

Potentially Severe Implication for Animal Agricultural in the Central Valley.

Analysis Estimates Economic Consequences of Nutrient Constraints on Central Valley AFOs

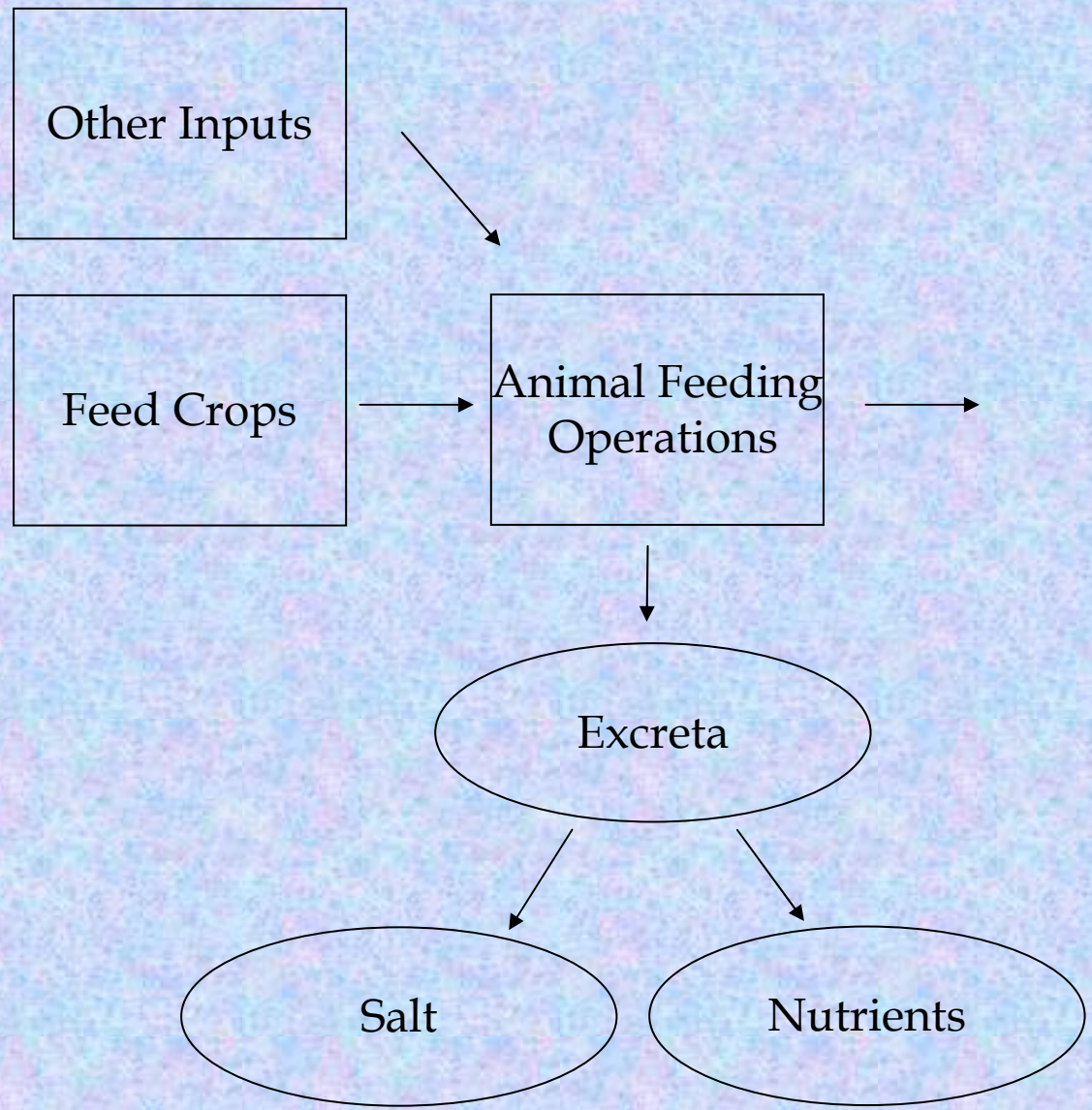
And Cost of Eliminating Salt Loading from AFOs in Tulare and San Joaquin Basins.

Animal Feeding Operations in the Central Valley of California

Dairy Cows
Broilers
Layers
Hogs
Feedlots

~63% of California AFOs

A Simplified Model of AFOs



Construction of a Baseline 2030 Scenario

CVPM Region Delineation

Nutrient Constraints with 100% WTAM

No Increased Cost of Feed Input

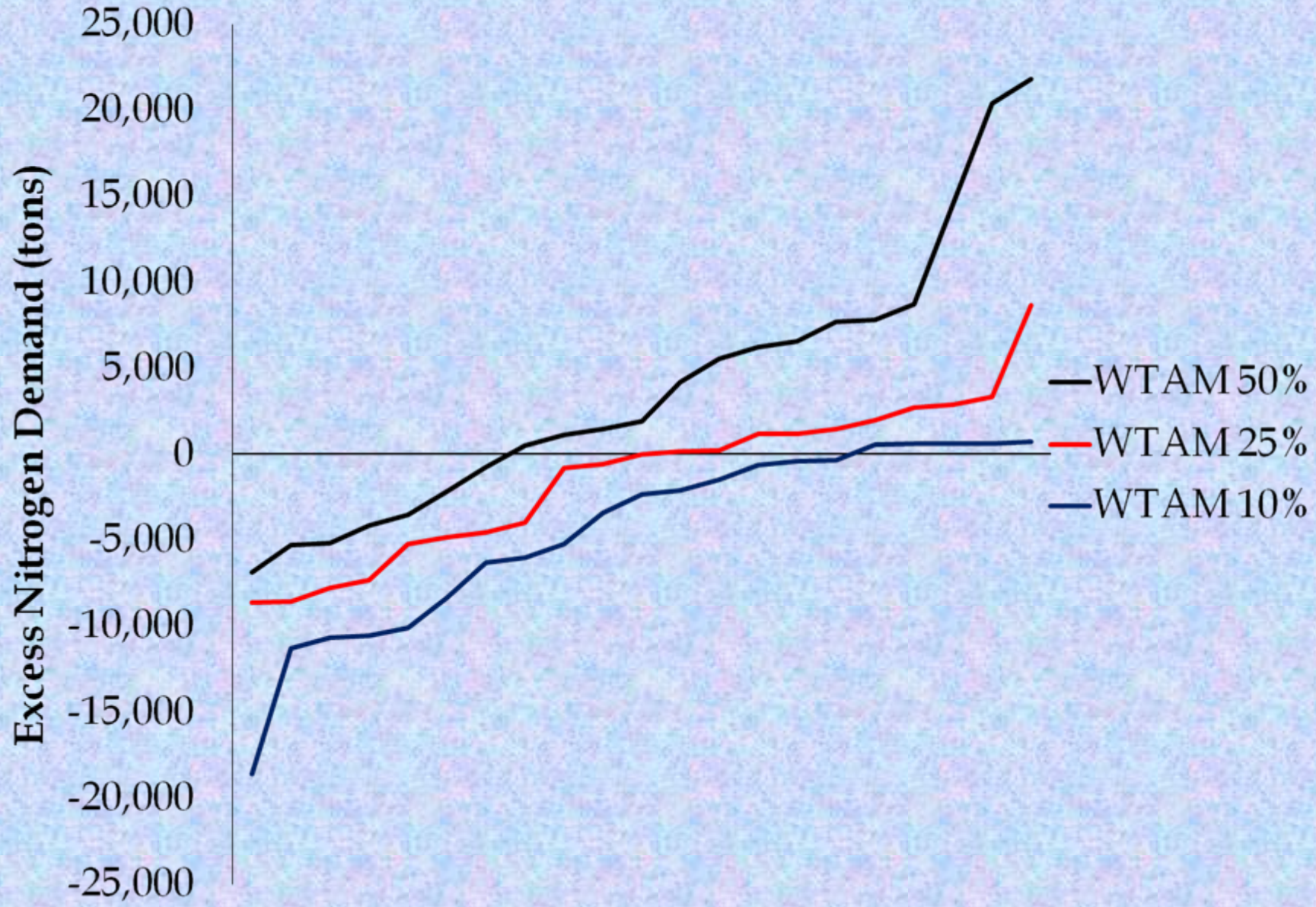
No Accounting of Salt

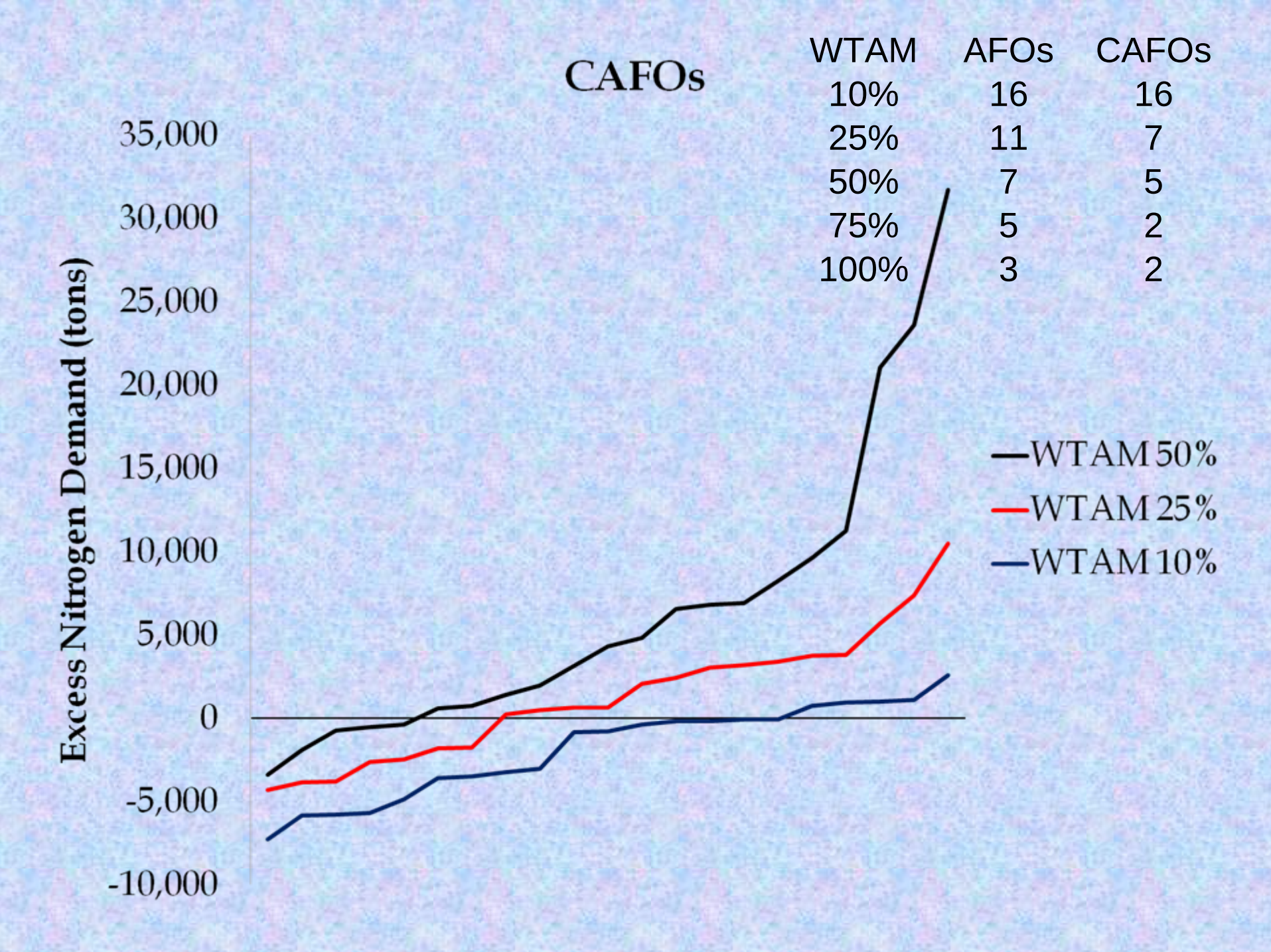
Willingness to Accept/ Apply Manure (WTAM)

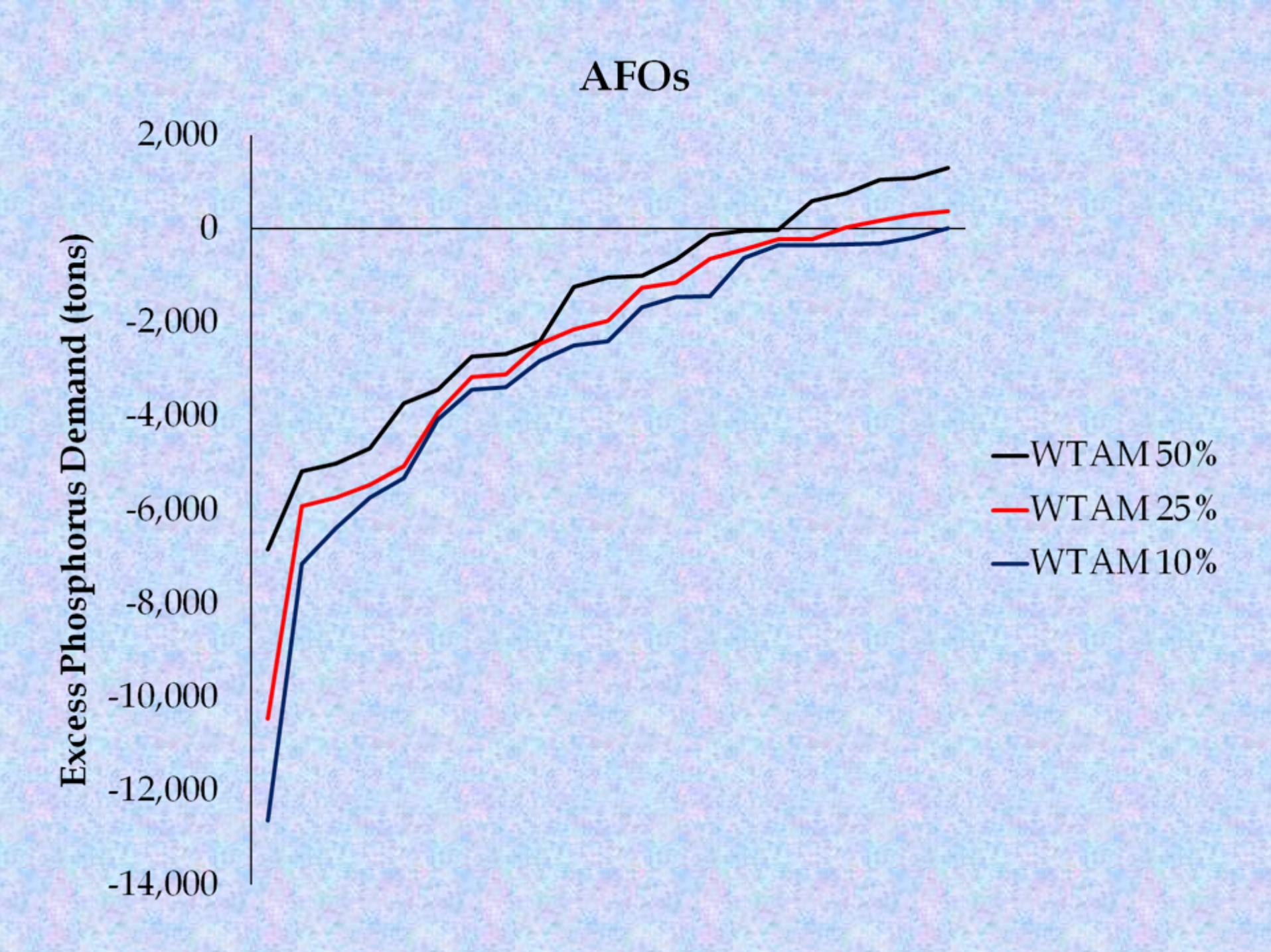
Disadvantages of Using Manure

Pathogens
Lack of Uniformity
Handling
Incompatible Nutrient Concentrations
Salt Concentrations

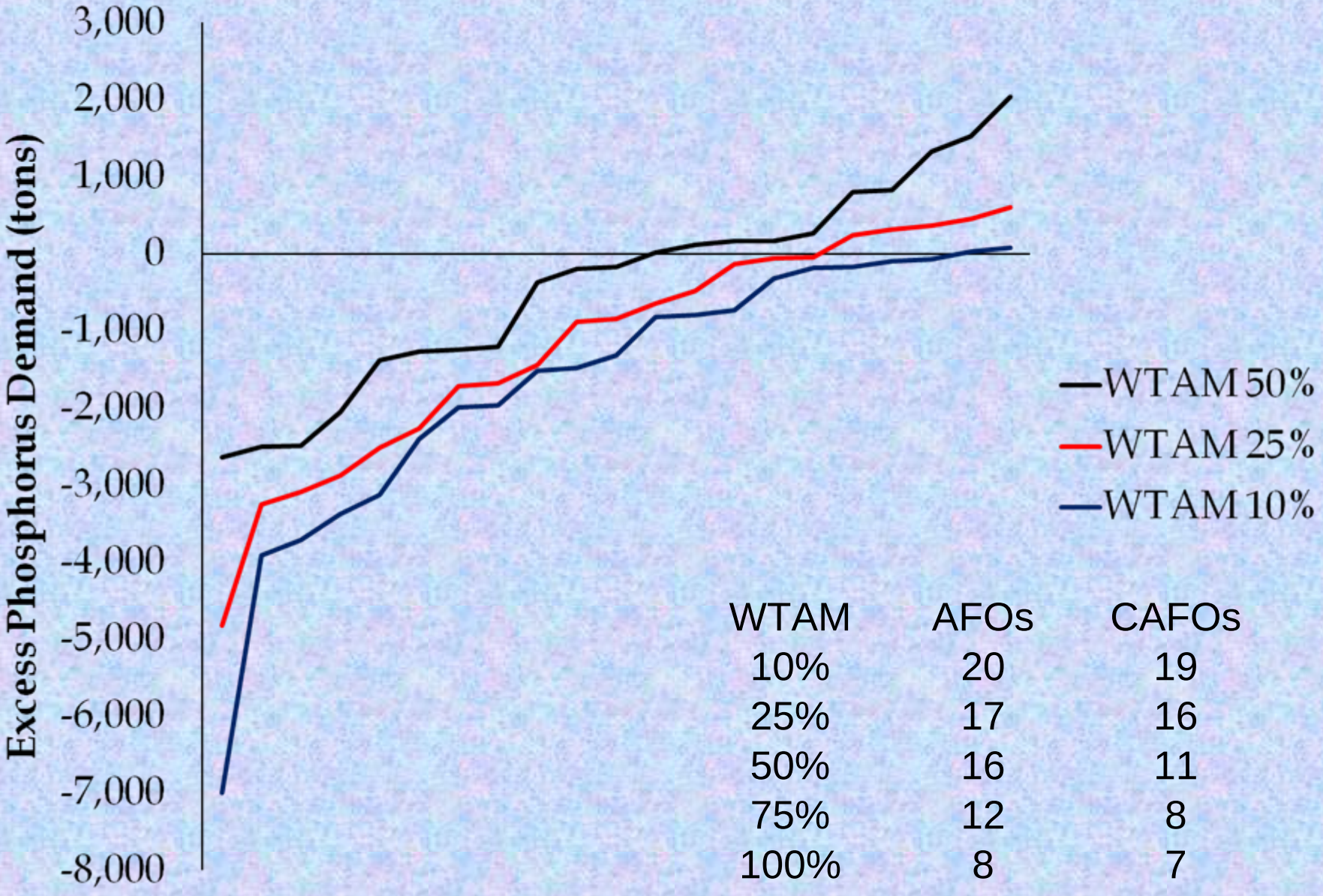
All AFOs


25,000
20,000
15,000
10,000
5,000
0
-5,000
-10,000
-15,000
-20,000
-25,000
Excess Nitrogen Demand (tons)
WTAM 50%
WTAM 25%
WTAM 10%


CAFOs
WTAM AFOs CAFOs
10% 16 16
25% 11 7
50% 7 5
75% 5 2
100% 3 2
Excess Nitrogen Demand (tons)
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
-5,000
-10,000
WTAM 50%
WTAM 25%
WTAM 10%


AFOs
2,000
0
-2,000
-4,000
-6,000
-8,000
-10,000
-12,000
-14,000
Excess Phosphorus Demand (tons)
WTAM 50%
WTAM 25%
WTAM 10%

CAFOs



WTAM	AFOs	CAFOs
10%	20	19
25%	17	16
50%	16	11
75%	12	8
100%	8	7

Alternative Baseline Scenarios

Decrease in WTAM

Historically WTAM between 10-20%

Increase in Feed Cost

Results

Base Case –Nitrogen Constraint
Net Returns = $5.66 Billion

AFO10-Nitrogen
Net Returns = $2.42 Billion
76% Reduction in Dairy Production
in Tulare County
~100% Reduction in Hog Production
~60-80% Reduction in Cattle Production
~60-100% Reduction in Poultry Production

Results

Base Case –Nitrogen Constraint
Net Returns = $5.66 Billion

AFO20-Nitrogen
Net Returns = $3.74 Billion
36% Reduction in Dairy Production
in Tulare County
~100% Reduction in Hog Production
~60-80% Reduction in Cattle Production
~40-100% Reduction in Poultry Production

Results

Base Case –Nitrogen Constraint
Net Returns = $5.66 Billion

AFO30-Nitrogen
Net Returns = $4.44 Billion
~0% Reduction in Dairy Production
in Tulare County
~100% Reduction in Hog Production
~40-60% Reduction in Cattle Production
~60-100% Reduction in Poultry Productio

Results

Base Case –Nitrogen Constraint
Net Returns = $5.66 Billion

BaseSalt-Nitrogen
Net Returns = $4.9 Billion
~8% Reduction in Dairy Production
in Tulare County
~100% Reduction in Hog Production
~25% Reduction in Cattle Production

Results

AFO10–Nitrogen Constraint
Net Returns = $2.42 Billion

Salt10-Nitrogen
Net Returns = $1.52 Billion
~100% Reduction in Dairy Production
in Tulare County
~100% Reduction in Hog Production
~50-80% Reduction in Cattle Production
~80-100% Reduction in Poultry Production

Concluding Remarks

AFOs in the Central Valley will likely incur Significant Losses due to Nutrient Constraints

Losses will Largely be Determined by Farmer Willingness to Apply Manure

Preliminary Scenarios Suggest Upwards of 50% Reduction in Net Returns

Restrictions on Salt Loads are likely to Further Erode Returns to AFOs

Again, Losses will Largely be Determined by Farmer Willingness to Apply Manure

Preliminary Results Suggest Eliminating Salt Loads in Tulare Basin will Reduce Net Returns by an Additional 0.5 - 1 Billion Dollars Annually